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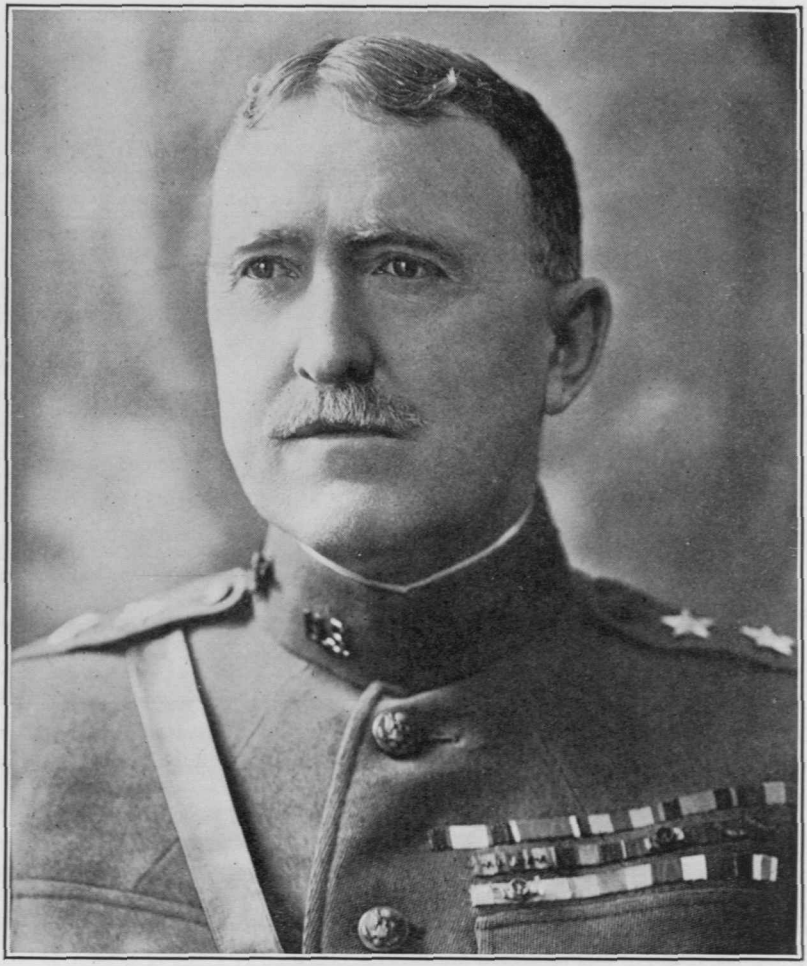

MAJOR GENERAL JOHN L. HINES

Successor to General Pershing as Chief of Staff of the Army

Born, West Virginia, 1868; graduated West Point, 1891; Adjutant General of the "Punitive Expedition" to Mexico, 1916; selected by General Pershing to accompany him to France as a member of his staff; Regimental, Brigade, Division and Corps Commander in France; Deputy Chief of Staff since 1922.

The Coast Artillery Journal

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Leadership

By Brig. Gen. Harry A. Smith, *U. S. Army*

Editor's Note: *The following lecture by General Smith, Commandant, General Service Schools, Fort Leavenworth, Kansas, was delivered to the members of the class of the Command and General Staff School last Spring. He authorized its publication in the* Infantry Journal *as well as in the* Coast Artillery Journal, *and it appeared in the June, 1924, issue of that magazine.*

IOLE! How did you know that Hercules was a god?" "Because," answered Iole, "I was content the moment my eyes fell on him. When I beheld Theseus, I desired that I might see him offer battle, or at least guide his horses in the chariot race; but Hercules did not wait for a contest; he conquered whether he stood or walked or sat or whatever thing he did."

Thus, as Emerson says, "the largest part of the power" of the gods of old "was latent—a reserve force which acted directly by presence and without means." I have no doubt this is true to a limited extent of all leaders and to a greater extent of the four great leaders of all history. Of Alexander and Hannibal we know but little beyond the record of their deeds and exploits; of Caesar we know that he did "bestride the world like a Colossus" and not much more. But of Napoleon we have many pen pictures and a study of his life is a study in leadership.

All four of these men must have possessed the ascendency over the minds of their men that Hercules possessed over Iole—that divine spark which makes some few men almost god-like in their influence over their fellows. Other leaders, who never attained the heights of greatness of these four men, had this spark. It is related that just before the second day's fight in the Wilderness, General Lee

rode along the front of the Texas Brigade drawn up for his inspection. Opposite the center of the brigade he turned his horse and silently faced his men. Knowing that many of them were going to their death, tears filled his eyes. He gazed at them in silence for a few moments, raised his hat and silently rode away. Then a tall rawboned Texas private stepped from the front rank and, facing the battalion, said with the greatest emotion, "If any ——— of a ——— here don't fight today, after what the General has just said to us, I will shoot him in his tracks."

Such leadership is god-like and defies analysis.

From the beginning of history men, thinkers, philosophers, dreamers, historians, psychologists, efficiency experts, have tried to analyze leadership into its component parts and to assign to each part its relative place in order of merit in the make up of the whole man. These men have always failed because there is no yard-stick by which the human soul—the source of leadership—can be measured.

Simon Peter was a brave man, he suffered shipwreck, torture and martyrdom that he might found the church of Christ on earth; yet Simon Peter in a moment of weakness denied his Christ. Can any human yard-stick measure the moral or the physical courage of Simon Peter? And so it is with the other qualities of leadership.

Again these classifications are of little value to us unless we can apply them to the improvement of ourselves.

Dr. Mann, a very able educator and scholar, gives the qualities of successful men in their order as, character, good judgment, understanding of men, administrative and executive ability, knowledge and manual dexterity.

Major General McGlachlin, an able officer and student, gives the qualities of military men as follows: Character, common sense and good judgment, understanding of men, executive ability, intelligence, knowledge, health, presence.

These classifications are excellent, but each heading requires a further subdivision. For example, character may be subdivided into from thirty to fifty subheads. After these subdivisions are made, an officer, by studying them and by studying himself, may improve his leadership.

I am convinced that there is a better way to study leadership, each officer for himself. Let each man observe those in authority, their manner of dealing with officers, with men, and with affairs; let him compare the methods used with his; let him determine what he would have done in similar circumstances and then watch results.

Also let him read biographies, autobiographies and memoirs with a view of studying the qualities of leadership as developed by

great men. Every officer, however busy, ought to read one such book each month. The proper study of mankind is man and the proper study of leadership is leaders.

Thirdly, there is the method in which leadership is taught in this school. There is a series of six lectures upon this subject. These lectures can do little more than call your attention to certain salient points of leadership and suggest methods of study. You are, however, given a wonderful opportunity here to improve your leadership. Every one of the 77 problems during the year is a problem in one or more of the phases of leadership, provided you make it so. No man was ever a great leader unless he knew clearly and definitely just what he wanted to do. In solving your problems see that you always know just what you want to do. It may be said that some problems are not clear; that there is too much fog. The fog of problems is as nothing compared to the fog of war. The strain in regard to class standing is as nothing compared to the strain of war, when the lives of hundreds of men depend upon your decision. If you can learn to come to a clear-cut, definite decision in regard to each problem, no straddling, no haggling, you have gone far on the road to leadership. Having come to this decision, can you write a clear, concise, complete and definite order; so clear that no subordinate can be misled by it? If so, you have taken another long advance on the same road.

At the siege of Toulon, Napoleon, merely a boy who had never commanded troops in war, elbowed his way into the council of war and, placing his finger on the map over the hill l'Eguillette, said: "There is the key to the position."

"In fixing upon the plan to be followed, he did not enter into local considerations, but picked out at once the point of importance; he determined this upon grounds of a military and moral nature, such as the situation as a whole furnished. It is one of the surest marks of a true leader that he knows in every situation how to set aside details and matters of secondary importance, and to combine and direct all the moral and physical forces at his disposal to the principal aim." "The greater, the more active, the wider an intelligence, the less it can linger over commonplace and trivial details." Bear this in mind in coming to a decision in map problems and you have done much to improve your leadership.

The object of map problems is to train officers in clear, accurate, logical thinking, resulting in a clear, definite decision and all when time is ample and conditions favorable. The object of the ten map maneuvers is to train officers in clear, accurate, logical thinking, but at the same time in rapid thinking. The map maneuver supplements the map problem in the training for leadership. Before action

the true leader takes all the time available for reflection and the weighing of evidence and with all of his mental energy he strives to arrive at a correct decision. But when the time to act arrives, stop weighing the pros and cons, stop ruminating, stop all doubts, make some decision—the best you can make—and then throw all of your energy—energy of mind, of body and of soul—into overcoming the obstacles that will surely arise to thwart the execution of your plan. I believe that Napoleon had this rapid thinking in mind when he laid down to his Marshals the maxim: "Always imagine what you would do if the enemy should appear unexpectedly on your front, on your flanks, in your rear." He wanted to prepare them for quick and accurate decisions. He, himself, had a master mind in making such decisions. At Marengo, when everything seemed lost, when he was advised by all his staff to retreat he attacked. He attributed this power to firmness of character. I prefer to call it the courage of responsibility and it is built up by a long process of correct and accurate thinking and by a habit of always making a decision when a decision is due.

It is much easier to judge of leadership in war than of military leadership in peace. In war mannerisms, personal idiosyncracies, irritating habits are brushed aside and results alone count. The strong and dominating military leader in times of peace makes many enemies and is sometimes rated as overbearing, harsh, dominating when he is really only strong. In times of peace social graces and pleasing manners are sometimes rated too high and at other times they are spoken of sneeringly as though these qualities in some way detracted from leadership. When Davoust, who up to that time had been an able, but not a brilliant soldier, was made a Marshal of France, many sneeringly referred to him as "a little bald pated man, fond of dancing." Davoust, the man who conceived and fought the brilliant battle of Auerstadt and who, during and after the retreat from Russia, commanded in turn and reorganized every corps in the French Army—"a little bald pated man, fond of dancing!" In judging leadership in time of peace, take great care that you do not lay too much stress upon appearances. At every post and in every organization there is always one officer to whom others go for advice and help in time of trouble. Watch those officers. They are always endowed with common sense and good judgment and knowledge of men. They are prospective leaders in time of war.

When I graduated at the Military Academy nearly 33 years ago I was assigned as Second Lieutenant to Company A, 1st Infantry. While on graduation leave I received a number of soldierly and helpful letters from the captain of my company. I joined that com-

pany filled with admiration and regard for my captain; I remained in that company as second lieutenant five years and I never lost my admiration and regard for him. He was the handsomest officer in the regiment and the best dressed. That was the day of the company tailor, but he, whenever the occasion demanded, always wore a Hatfield uniform. He was soldierly in his bearing, dignified but friendly. Shortly after I joined the company the annual inspection occurred. When the report of that inspection was published it stated in substance that Company A, 1st Infantry, stood alone in the department in drill, discipline, dress and all of the elements that go to make a good company. A similar report was made each year. There were many good captains in the 1st Infantry, and many more in the Department of California, but Company A, 1st Infantry always ranked first. I have often tried to analyze that captain's qualifications for leadership—what made him the best captain and the best leader in the department. His most pronounced characteristic at that time was interest in his company. He was a popular man in San Francisco society, in sports, in club life and in National Guard circles, but none of these ever was allowed to interfere with his interest in his company.

His second characteristic grew out of the first—he was never satisfied with a mediocre or niggardly performance of duty on the part of any subordinate. The best was none too good.

His third characteristic was the faculty of issuing clear, concise and definite orders, so clear that he who ran might read. Some of them issued to me were more forcible than elegant but I always knew what they meant and that they were given to be obeyed. The same characteristics—interest in his job, hatred of a niggardly performance of duty, and clear thinking promoted him without pull or influence ahead of his brother officers to be a brigadier general and soon a major general. I am sure that helpfulness and stimulation have accrued to every officer and man who ever served under Major General Thomas H. Barry.

Not long ago I heard a Colonel of Infantry talking to his officers about target practice. The regiment had not done well the year before and the Colonel had received a letter from the Corps Area Commander telling him so. To his officers he justified the poor showing made on the ground that the regiment had been overworked but he stated that the coming year he expected every company to make 80 per cent. Below 80 per cent, I may say, is regarded as unsatisfactory and requires explanation. Shades of Thomas H. Barry! Eighty per cent set up as a mark for a regiment to shoot at! Had Thomas H. Barry been the Colonel of that regiment it would have been worth

going miles to have heard his address. An 80 per cent commander means a 40 per cent organization. Interest in the job and high ideals are essential to true leadership.

Those of you who were in France during the winter of 1917-18 will recall the low ebb to which the morale of the allies had touched. There was no talk of victory, no mention of a vigorous offensive, no allusion to imposing our will upon the enemy. During that winter I visited the British and French fronts. There was no training, no plans for a vigorous offensive. The talk, the training and the plans were all for the defensive—barbed wire, concrete pill boxes, hand grenades.

"The stagnation of trench warfare, the continuous front and the principle of attrition were deliberately maintained because the military minds were too timid to venture for large stakes, and this principle substituted for the idea of maneuver marked the most astonishing retrogression in military art that has ever been seen—a desire to shun decision by battle and shun responsibility."

For four months the American Commander-in-Chief had breathed this air of pessimism, had had these military sophisms and subtle fallacies poured into his ears but, through it all, he never lost his perspective or his clearness of vision and with that courage of responsibility which has marked every great leader he flatly announced that "all instruction must contemplate the assumption of a vigorous offensive. This purpose will be emphasized in every phase of training until it becomes a settled habit of thought." That decision courageously made and courageously maintained entitles General Pershing to a place among the great leaders of all time. It was the same courage of responsibility that Hannibal displayed when he carried the war into Italy, that Caesar showed when he crossed the Rubicon, and that Napoleon manifested when he hurriedly marched his army from the English Channel to hurl it upon the Austrians at Ulm before the Russians could come up. Courage of responsibility is one of the highest elements of leadership.

Marshal Foch said a year or so ago at the Army War College that the most difficult thing in war was to have an order executed. He might have added that it is one of the most difficult in time of peace. To have orders executed requires constant supervision and inspection on the part of the commander. Between an order issued and an order executed there is just the difference between word and deed. The greatest military commander the world ever saw was the man who best exemplifies this principle of leadership—Napoleon.

His activity in personally inspecting the execution of his orders was no less great than his intellectual activity in conceiving them.

He held frequent reviews but they were not for the purpose of enabling him to gallop around the troops with a showy staff; they were held for the purpose of inspection—how many combatant soldiers were present, what was the condition of their arms and ammunition, their clothing, shoes and rations, their morale and discipline.

He was constantly inspecting troops on the march, in bivouac, in camp, on outpost and in preparation for battle.

When unable himself to inspect he sent staff officers to inspect for him. In sending Segur, an experienced staff officer, on a tour of inspection, he concluded his written orders with these words: "This officer must set down nothing by hearsay. He must see everything with his own eyes, say nothing but what he has seen and when he is obliged to say something he has not seen, say he has not seen it."

Again in 1810 when he sent Colonel Lejeune to Spain, he said to him: "Set out for Spain. See everything in detail, men, and material, and note everything. Return without loss of time and act in such a way that when I speak to you I shall believe I have seen things for myself." Then when dismissing him the Emperor graciously added: "Go and win your spurs."

This supervision of the execution of orders is one of the first essentials of leadership and it is founded on physical and mental activity.

In this connection I should like to quote from General Orders No. 1, War Department, 1924, entitled "Notes on Training": "Without exception the best camps, during the past year, were those in which the camp commander took the most active part in the training. He can be more easily replaced in the office than on the training ground, as his rank and prestige and active participation in the training can give to it an interest and meaning not otherwise obtainable."

The officer who wrote that paragraph is a good observer and knows the principles of leadership. I commend that paragraph to you when you go to your new duty and that, whether you go to the Regular Army, the National Guard or the Organized Reserves.

One of the best regiments I ever served with and one of the best I ever saw was commanded by a Colonel who at first call for any drill, ceremony or tactical exercise was on his horse and required every field officer in the regiment to do likewise. That Colonel was an excellent drill master and instructor, but had he been only average his presence alone and his interest would have inspired officers and men to better work.

Supervision of drill and training is closely allied to supervision of the execution of orders and is based on physical and mental activity.

In the Notes on Training published in General Orders No. 1 and referred to above there appears this paragraph: "The usurpation of the appropriate authority and responsibility of subordinate commanders by higher commanders continues to constitute a marked deterrent in the development of the individual initiative of officers. Younger officers and noncommissioned officers appear to be overcommanded."

That is a severe criticism upon some of the leadership in our Army and it is a just one. There are few officers here who have not at times been overcommanded. This overcommanding is a fault of some strong and able men. It grows out of a desire for quick action and fails to recognize that in the hierarchy of command every officer has a job of his own. The true principle of leadership is that every commander should command his own unit and be responsible for his own unit. The test for this fault is this: "Tell your organization commanders what to do but not how to do it." Every time a battalion commander tells a captain what to do and how to do it he takes from the captain something which does not enrich the major and makes the captain poor indeed. The major should judge his captains by results and not by means and methods. He should encourage in his captains initiative and courage as it is only by possessing these qualities that the captains can act well when thrown upon their own.

To train and lead an organization in this manner requires constant supervision, inspection, tests and, above all, courage. Mediocre and indifferent officers resent comparisons and competitions. Tests between the companies of a battalion conducted by the major with a spirit of fairness and helpfulness and published to the battalion weekly will do wonders in improving the efficiency of the battalion. The same is true of the regiment, the brigade and the division.

Some commanders have too tender a regard for the feelings of subordinate officers to correct obvious errors, and especially is this the case when the subordinates have attained field grade. In times of prolonged peace these older officers are the first to slip, to become careless and to become satisfied with a mediocre performance of duty, and then it is that the commander should use both "his rod and his staff."

I once had the pleasure of commanding a battalion alongside another major who was a wonder in the influence he had over his officers and especially the men. When he was promoted to be a

lieutenant-colonel, I heard the commanding officer say to him: "Now your methods must change. You will no longer be in a position to bring a direct influence to bear upon the enlisted men." Memories of Napoleon! Where did that Colonel get his ideas of leadership!

The greatest military leader the world ever saw was, and remains, the leader who best understood the enlisted man. Had I the authority I should compel every officer to own and to read and re-read that most interesting book, "Napoleon at Work," and especially the chapter upon enlisted men. Napoleon possessed "the power of animating the enlisted man and filling him with enthusiasm, the fluid which is communicated from the leader to the trooper, that magnetic power without which every great general is incomplete. He was in the highest degree an exciter of energy." "While the Emperor knew how to stay his generals' pretensions with a firm hand, he spared no pains to encourage and satisfy his soldiers. With this object in view he employed all the material and moral means at his disposal; promotion, honorary distinctions, material advantages of all sorts, the skillful exploitation of all feelings which impel men to action—pride, vanity, emulation, sense of military honor—and a rational employment of that personal influence which confers on certain men the gift of subjugating armies and crowds." ("Napoleon at Work," page 215.) Not every officer is endowed with the divine gift of subjugating companies, battalions, regiments and brigades. Every officer is capable of raising the pride of his battalion and regiment to a high pitch, and of inculcating a high sense of military honor in officers and men of his command. Men like it. It is rarely that a man wants to transfer from a good organization to a poor one. As a body the enlisted men know the leader when they see him work and they always respond to the right kind of leadership. The less leadership there is in the lower ranks the more necessity for it in the higher. If Napoleon attributed half of his success to the value of his soldiers, do not fancy that a lesser man may ignore that value.

This handling of soldiers is the highest art of leadership. In this connection my attention has been called to an article in a recent number of *The American Legion Weekly* entitled "What's Wrong with the Army?" This article has given grave offense to many officers who throw it down with the words "damn bolshevik." The article has received, however, some favorable comment from officers and men who served during the World War.

The gist of the article is that regular officers generally do not understand enlisted men and that there is "a too frequent lack of the human touch in dealing with the bewildered men in the ranks" with a particularly vicious slap at saluting in general. The writer of the

article is a man who generalizes from a few special cases and his article requires no further comment. The article shows, however, the importance of every officer in our army studying the enlisted man and how to handle him. I am convinced that the American soldier hates babying and coddling, that he likes straightforward, positive dealings, that he wants his officers to be strict, fearless, honest and to show by some outward and visible signs that his interests are their interests. The art of leading men is worthy of your best study and best effort.

There is a difference between leading a well disciplined and trained company, battalion or regiment in the Regular Army and leading a newly raised organization in the Reserves for example. In the first case when new men join they learn much by absorption and observation of their more trained and disciplined fellow soldiers. In the second case, the officers must lead and inspire these men by their teachings and example. The problem presented to such commanding officers is similar to the problem in leadership presented to Napoleon, for he did not inherit a well trained and disciplined army —he made his army from untrained levees. His methods are worthy of your best study.

The above mentioned article from *The American Legion Weekly* refers to "the incessant and wearisome saluting, the overdone enforcement of deference" as the great source of discontent among our men in France. Again I think the writer, who claims to have been a battalion commander, is generalizing from a few cases. From the tone of his remarks I can easily visualize what a poor saluting organization his battalion was. I had under my command once in France twenty-one schools and training centers. Of these schools and training centers, two were commanded by officers now on duty here—one a member of the Faculty and one a student officer. These two schools, one a candidates' school and one a tank center, had more enlisted men connected with them than all the other schools combined and both schools were outstanding in the matter of saluting. All of their men seemed to know how, when and where to salute and to take a pride in saluting in a military manner. I do not know what methods these officers used, but I will venture that example by the commander himself was at the bottom of all instruction. As for the instruction itself, it began by causing the whole mass of the command to appreciate these three facts:

1. Saluting properly done as to time, place and execution is simply one outward manifestation, easy to show, of a sound spirit within the man and the command.

2. Saluting properly done is an evidence of good military manners and a protection to the soldier against embarrassment.

3. Saluting, uniform and correct, is a protection of the whole command against unfavorable impressions on the part of those who have time and opportunity for a cursory knowledge only.

Any commander following that method will have an organization with one of the outward and visible signs of an inward and military grace.

In true leadership example counts for much.

Every great leader from Napoleon down knew how to talk to soldiers. No great leader ever talks over their heads or under them, but to them. Napoleon's addresses to soldiers are models: "That which contributed to conquer the soldier's heart was the fact that this great man did not hold himself aloof in his grandeur; he was a familiar genius who spoke to them like a father to his children, and so much so that they imagined that they belonged to him." "In 1805, on the Danube, he hastily visited the regiments, spoke ardent words to them, formed them into a ring in the midst of the thickly falling snow and with the mud up to their knees, told them of the enemy's position, and said that he counted on them." All these show how familiar were the relations between the leader and the humble companions who shared his glory. He himself said: "My soldiers were very free with me. I have met many who theed and thoued me. They were instinctively sympathetic; they knew that I was their protector."

The Duke of Wellington as a soldier and a commander was a star of the second magnitude but as a leader he drops far down the scale. He had no knowledge of men and could not appeal to their better instincts. He frequently referred to his troops as "the scum of the earth." Some day when minutes are not so precious to you as at present, read Stonewall Jackson's farewell address to the First Brigade, the Stonewall Brigade, when he left it to go on the Valley campaign.

Critics and purists will likely tell you that it lacks literary merit and savors of the commonplace. Perhaps it does, but it carried conviction to those soldiers. After having spoken briefly of their deeds and referred to his hopes of them, he rose in his stirrups, threw the reins upon his horse's neck and said:

"In the Army of the Shenandoah you were the First Brigade! In the Army of the Potomac you were the First Brigade! In the Second Corps of the Army you are the First Brigade! You are the First Brigade in the affections of your general, and I hope by your

future deeds and bearing you will be handed down to posterity as the First Brigade in this our second War of Independence. Farewell."

For a moment there was silence; then the pent-up feeling found expression, and cheer upon cheer burst forth from the ranks of the Valley regiments. Waving his hand in token of farewell, Jackson galloped from the field.

Ability to address soldiers is a great asset to leadership, but addresses to them are worthless if they come only from the brain and not from the heart.

You will notice that among the necessary qualities of great leaders that intelligence and knowledge are placed rather low in the list of both Dr. Mann and by General McGlachlin. This is likely true in many cases. Among American leaders there are two, and, strange to say, they bear the same name, who best exemplify the truth of this classification, Stonewall Jackson and Andrew Jackson. Of Stonewall Jackson, Henderson, his admiring and loving biographer, says: "His attainments were not varied. His interests, so far as his life's work was concerned, were few and narrow. Beyond his religion and the army he seldom permitted his thoughts to stray. His acquaintance with art was small. He meddled little with politics. His scholarship was not profound and he was neither sportsman nor naturalist. Compared with many of the prominent figures of history, the range of his capacity was limited."

Of Andrew Jackson, it is said that he had never in his life read one book through, except perhaps the little story of the Vicar of Wakefield. It is certain that he had little interest and almost no knowledge of art, of science, or of literature.

Of Stonewall Jackson, Henderson says: "He saw into the heart of things far deeper than most men. He had an extraordinary faculty for grasping the essential and discarding the extraneous. His language was simple and direct, without elegance or embellishment, and yet no one has excelled him in crystallizing great principles in a single phrase. The few maxims which fell from his lips are almost a complete summary of the art of war. Neither Frederick, nor Wellington, nor Napoleon realized more deeply the simple truths which ever since men took up arms have been the elements of success."

Let me try to picture to you Andrew Jackson on the afternoon of December 23, 1814. He was a Major General, commanding the American forces at New Orleans. Excepting as a boy of thirteen, in two small skirmishes toward the close of the American Revolution, he had taken no part in civilized warfare. He was sitting in a room in New Orleans studying some papers and maps. His troops were scattered in and around the city. He did not know that the British

were within miles of him. In came some countrymen who stated that the British advance guard had reached Villare's plantation, about nine miles from the city. Rising to his feet, he solemnly exclaimed: "By the Eternal, they shall not sleep on our soil tonight." Then eating his lunch of a bowl of rice, he began ordering his troops to march. The British troops at New Orleans were the flower of the army. They had seen long, hard service in Spain. They were commanded by Sir Edward Packenham, a brother-in-law of the Duke of Wellington and one of the most accomplished officers in the army. All in this army, officers and men, believed that the Americans would never attack—that they were too undisciplined. Here Jackson's leadership conquered. In the early morning of December 24, he attacked the British advance guard and defeated it. It is generally said that the Battle of New Orleans was fought on the 8th of January, 1815, but as a matter of fact it was won on the morning of December 24, 1814.

Andrew Jackson and Stonewall Jackson may not be ranked among the great intellects of the world; their minds were not compendiums of universal knowledge; but each ever saw clearly the task in front of him and with each to think and to see was to act. Each knew the simple principles of war and from these he could not be swayed by doubters, by timid souls, or by routine officers to whom every departure from the commonplace is a shock.

In every government, every army, every big commercial concern there are two parts—the purely business side and the theatrical side. This is best illustrated in the government of Great Britain where the cabinet, responsible to the parliament, conducts the purely business affairs of state, and the King, almost powerless in the business affairs of the nation, conducts the theatrical side. In any army or any subdivision of it the commander must play both parts. All soldiers love ceremonies and military pageants when they are conducted properly and with due regard to the theatrical properties. I served in a regiment of infantry once which worked hard every morning. It was stationed near some large summer hotels. It was soon found that some officers were spending too much time there, drinking too much and contracting bills beyond their means and that too many enlisted men were being tried for drunkenness. The Colonel of the regiment started five o'clock parades. The plan was not a success at first—it was too much like a rehearsal—there was no "pep," no enthusiasm, no audience. Then he conceived the idea of an audience. Officers were urged to invite their friends from the town and the hotels, refreshments were served at the club and it was not long until these became popular social functions and an enthusi-

astic audience of two thousand people was not at all uncommon at these ceremonies. The dress, the bearing, the discipline of officers and men improved at once. Each regarded himself as the cynosure of all eyes and bore himself accordingly.

Most great leaders have appealed to the theatrical sense of their officers and men as an aid to leadership. It is only one of the means and not an end.

The National Defense Act of 1920 commits us to a voluntary military system; it accepts the fact that our wars must be fought by armies composed of citizen soldiers; it provides in peace the machinery for rapid and orderly expansion into a suitable force when war comes and after Congress and the President so direct.

Under this new regime we have a Regular Army, so small that the total combatant elements within our continental limits could all be seated in one of our athletic arenas. From this force we provide officers and trained specialists as the instructors and guides for the purely citizen forces, and furnish the officer personnel for the War Department and the higher headquarters. The National Guard with our little Regular force becomes our first line for immediate defense, behind which we shall undertake to develop the great reserve of citizen forces that must constitute at least seventy-five per cent of the war armies. These reserve elements exist only in skeleton or outline form. The officers of this reserve, nearly one hundred thousand, we have, and they are assigned to specific skeleton companies, regiments, and divisions, allocated according to population. There are thirty-three of these divisions now organized, each with an active headquarters composed of a few skilled regular officers. In addition, there are more than four hundred skeleton regiments of special troops. All this framework of a reserve has been maintained during the past year with an appropriation of less than two millions of dollars.—*General John J. Pershing.*

Handling the Soldier

By Major R. N. Perley, C. A. C.

THE American Army officer enters upon his career well equipped in so far as academic preparation is concerned. This is insured by the curriculum of the greatest military school in the world—West Point Military Academy—and by the somewhat rigid examinations which must by passed by applicants from colleges and from the ranks. Early in his military service, the officer learns what is expected of him, and generally, the mechanics of its accomplishment.

In the Regular Army, the officer body is well balanced. Within its numbers may be found every type whose viewpoint is essential to the ideal composite mind. The ideals of honor, patriotism, devotion to duty, and implicit adherence to rules of discipline, are best represented in the graduate of West Point. The civilian graduate of college, while having a generous supply of the above qualities, is especially valuable to his contemporary officers, because of bringing to them the view point of the civil population—which will ever constitute our war army—and remind those officers that it is not meet that the Regular Army depart too far from the throbbings of the civilian pulse. Then there is the officer, who, because of inherent qualities that recognize no defeat, and in spite of handicaps of lack of education and environment, rises above his fellow enlisted men of the ranks, and wins his commission. No element of the officer body comprehends the soldier as do these sturdy officers. It becomes apparent that without any special effort then, and by the simple process of rubbing elbows, the type Regular Army officer has a broad outlook on his profession, with particular regard to the handling of the soldier.

Nevertheless, so far as the writer is aware—and he has made a life study of his subject—at no time from his initial commission in the service until his rank is such that he is no longer in intimate contact with the soldiery, is the officer given systemized and carefully analyzed and supervised instruction in the proper methods of handling enlisted men.

How often have we contemplated the situation of an officer of high attainments in his profession, commanding an organization alongside of an officer who from an academic point of view, is

mediocre, but who because of an understanding of human nature that is instinctive, carries his organization to far greater heights in target practice, appearance or whatever else the two organizations (and therefore officers) are competing for. How many times have we seen a run down organization with no change in personnel other than the commander, emerge from its lethargy and lead contemporaneous units in the activities of the day! We are prone to dismiss the subject by accrediting the successful officer with having qualities of leadership, but without analyzing his methods to seek out and harness the intangible quality which enabled him to outdistance a far more talented brother officer. Let us for a moment trail the quality and see if we are fortunate enough to overtake and grasp it.

A company officer we will suppose has been ordered to command a run-down company. Other officers had skillfully avoided being assigned the command. The prior commander we will assume has even asked for his own relief from the command. Let us even go so far as to assume the reader is the new company commander. This assumption will enable the reader and the writer to "tune in" their thoughts more intimately.

We encounter the First Sergeant on the walk by the parade ground. The sergeant salutes stiffly with no warmth in his expression. He does not know of your recent assignment. His attitude must be corrected. "Good morning, sergeant. I want to talk to you for a moment. Are you busy?" "No, sir," says the sergeant, stiffly. With an air of perfect frankness and confidence you inform the sergeant, "Sergeant, I have been detailed to command your company. I don't know of any assignment that could please me more." (This is the truth, for it is evident that with so many evident improvements to initiate, your tour of duty is bound to be regarded as successful, even if when you leave the company it lacks much that is desired.) "It's our company now, sergeant. Wouldn't it be sort of pleasant to be able to say that our company is the cleanest, neatest, and best instructed on the post? Wouldn't it sound sort of nice, and, sergeant, wouldn't it sound perfectly natural, to say that our company came out first in big gun target practice, first in small arms target practice, won the baseball league, etc.?"

The sergeant begins to warm up. He detects the "human" note in your conversation. His tongue loosens. He tells you of the numerous ills of the organization, how he has never been backed up, how the mess is poor in quality and badly in debt. You listen thoroughly, making a mental estimate of the situation. You very carefully avoid making any promises, but maybe you interpolate, "Seems to me that between the two of us, we ought to straighten

that matter out, don't you think so, sergeant?" Of course he thinks so. He would have worked his head off for the prior company commander—and without being ordered to do so, had be been backed up to the limit and been treated not only as human but as a most important human around the company.

Similarly, and without any formality, you visit the mess sergeant in the commissary, or in the kitchen, or on the walk, or wherever chance causes you to encounter him, and you gain his confidence and support. Because its *we* who are running the mess, you and the mess sergeant. We are thinking up ways to improve the mess. The mess sergeant informs you that there is no discipline in the mess hall, that the men waste the food, that the kitchen police are slovenly, leave their work with impunity. "Well, sergeant," you say, "now the question is how can we best make the changes without antagonizing the men. You know, sergeant, it's much easier if the men are pulling with you. I will drop in at mess time this noon and just watch things as they are. I will probably have a little talk with the men. Perhaps I can help a little. The important thing just now is to get out of debt. I notice you don't keep a budget system of accounts. How much allowance do you have for the three meals of each day?" "I don't know exactly, Captain," says your talented (latent) but unsupervised and uninstructed mess sergeant.

You arrange an appointment at which you explain a simple budget system to be submitted each morning at eight o'clock. Notice, please, that you didn't come pompously down to the office and say, "Orderly, tell the mess sergeant I want to see him in the office at once." You had a perfect right to issue such an order and see that the sergeant later carried out all instructions you may have issued to him. No, you probably said to the mess sergeant after mentally concluding that the time was convenient to yourself, and probably to the mess sergeant, "What will you be doing at abount two o'clock this afternoon? You will have your commissaries all in by then, won't you? Suppose you drop in about that time in the office." This soldier sees immediately that you are a comrade. He knows your authority. You don't have to assume a false dignity or mannerism to demonstrate the fact. On the contrary, he falls wholeheartedly in behind your leadership by an act of his subconscious mind. You will have to work nights a bit for a few weeks. The men see you are tireless. For every hour you work, every principal man in the company will duplicate willingly. A hundred pairs of hands can make a big impression around a barracks.

You drop around at mess time as you had planned. Somebody calls attention. "Go right on with your meal, men. I'm just looking

on," you explain. When the meal is drawing to a close, you instruct the senior noncommissioned officer present to call attention, and address the men, perhaps somewhat as follows:

"Men, as you probably know, I have been assigned to duty with this company. I am much pleased to be here. Some officers think I drew a lemon. We'll show them. How about it? Men, before three months have passed we'll have men from every other company on the post putting in applications for transfer to our outfit. The baseball players will want to come so as to play on the winning team, the basketball players will want to come. They will all want to come. And, men, believe me, we'll take the pickings only. How about it? Now what kind of a company will they want to come to? To start with, they will want an A-1 mess, a mess that will draw all the casuals on the post. Casuals pay us good money for their meals. But they won't come here to eat if there is anything about the place which suggests a pig pen.

"You are entitled to good food and plenty of it. You are entitled to clean tables, clean tableware, and clean kitchen police. These kitchen police belong to you. When one of them tries to serve you in his dirty underclothes, grab him and place him under the showerbath clothes and all, or stick him head down in the garbage can where he belongs. I mean nothing personal about the men who happen to be on KP duty today. They are living up to the standard of the company as it used to be. Speak your minds and hold every man on duty up to the standards which we are now setting.

"You men probably have noticed that the garbage can is filled after each meal. That is money wasted. The company fund is in debt. We must save money. We can do that without living on 'Government straight' only by seeing to it that each man places on his plate what he is sure of eating. Come back for a second helping if you wish. There will always be plenty, but let's save this money from going into the garbage can and use it for Company Smokers celebrating the inter-company soccer championship, or the shooting championship.

"That reminds me. There is one good shooting company on this post which boasts it will double the number of experts made by any other company. Now we don't plan to do any boasting, and this is a special duty company and doesn't have to shoot at all if it doesn't damn want to. But I suggest it would be a good way to show these other outfits where to get off, if we went out not to whip the company which openly challenges us, but to get a number of experts qualified to equal the total of the other companies of this battalion. What do you think of it, men? Have you got enough

stuff in you for that? You know when you enlist, the doctor makes you undress. That's so no old women get by. How many men think this company has got stuff enough to sail in and clean up in the rifle shooting this year. Stick up your mits. Good. We've got it half won already. The will to win is half the game."

And so you establish your contact with the company as a whole. The thread of your theme is resumed each time you see fit to talk to the whole company. You talk a language which they understand. You work as hard as the best of them. Minor matters you keep in mind, and when a major matter makes it desirable to address the company you do it informally and unexpectedly, and at the same time bring up minor matters which you have held. Ever uppermost in your mind is the masterful study of the temper, better, the psychology of your company. Each group of men has its own problem in psychology. Your task is but to solve the problem in such a natural way that no outsider is conscious that you are solving a problem. At the same time, you work out the psychological riddle of each and every man in the company, of course with especial attention to the principal men. Always are your relations informal, casual, and from the man's point of view, accidental. As you encounter a member of the company you pick up the thread of conversation which you are using to solve him as one of the efficient working agencies of the company. Your conversation is aimed to bring out his special abilities, interests and troubles. The man notes your interest in him and the company. Your enthusiasm is contagious. Your man becomes a booster like the ninety-nine others.

The mess improves, the barracks are cleaned, painted, and distinctively decorated, the day room is the pride of the company, the bunks are painted, lawns are trimmed, flower gardens sown with the company number. Morale rises. Athletic championships begin to come in. Drill improves and success at target practices is assured. Note that up to that point you have not drawn heavily on your talent as a tactician. You have not succeeded because you have made the men in your company obey your wishes. You have succeeded because you have worked the men into such a state of mind that *they want to do what you want them to do.* This is the intangible quality in leadership which so few officers master while yet young in the service, and therefore still intimately in contact with the enlisted man.

Artillery Materiel

By MAJOR J. B. ROSE, *Ordnance Department*

A lecture delivered to the officers of the Advanced Course, Coast Artillery School

IT IS my object in this talk to give you in the short time available a resume of the status of development of artillery materiel. I will give you first a brief statement of the manufacturing program which is under way, for this represents crystallization of development. This will not take much time, for we are doing very little in the way of manufacturing materiel for issue to the service. Considering first artillery for our fixed defenses, we now have under manufacture only 14-inch railway and 16-inch barbette carriages. The project approved by the War Department for seacoast defenses includes a number of 16-inch guns on barbette carriages and this materiel has been manufactured as fast as funds have been appropriated by Congress. At the present time six guns and carriages have been completed and shipped—two to Hawaii, two to Boston, and two to Fort Tilden, N. Y. Eight more of these units will shortly be completed—the first four going to the Pacific end of the Panama Canal and the second four to Oahu. Completion of the remaining units depends upon the rate at which funds are appropriated.

It may be of interest to you to know that the last disappearing carriage built, and possibly the last one which we may ever build, mounts a 16-inch gun and is emplaced at Fort Michie. This carriage is the only one of its kind, in the United States at least, which permits firing up to an angle of 30 degrees, and this angle seems to be about the maximum which it is practicable to obtain from that type of carriage. It is interesting to note that in the 16-inch gun project we are using Navy guns, which were rendered surplus in the Navy due to the agreement on limitation of armament. This 16-inch gun project is of considerable interest in view of the recent joint Army and Navy maneuvers for test of the defense of the Panama Canal, which seem to have demonstrated the necessity of additional long range guns for defense of the Canal, and to cover passage through the Canal by battleships.

We have completed four 16-inch howitzer carriages with their howitzers, and, as you know, these have been emplaced at Fort Story.

Manufacture of any more of these howitzers has been discontinued, although the original project provided for a large number. Since the 16-inch howitzer is nothing more than a 16-inch gun of shorter range, it appears better to limit our work to the gun, which can do practically everything the howitzer can do and has almost twice the range. In all new construction gun carriages permit elevation up to about 65 degrees so guns can perform the functions of howitzers or mortars as well as the functions usually assigned to the guns. In other words, the modern gun has become a universal cannon.

I have not considered the question of antiaircraft artillery. This is, of course, one in which you are much interested, and every effort is being made to improve this kind of artillery. The existing types are not satisfactory. The 75-mm. gun which you have seen mounted on a truck is one of the first improvised war types and is unsatisfactory both in its ballistics and general performance. The 3-inch gun, which is mounted over the center of a 4-wheel trailer, has better ballistics and somewhat more stability, but it is not a satisfactory mount as to either range or accuracy. The third type, which is a fixed pedestal mount, is the best and is generally admitted to be fairly satisfactory. This gun has a muzzle velocity of 2600 f.s., which more nearly approximates requirements. There are 159 of these in service. We are now submitting estimates to Congress for enough money to start the manufacture of thirty more, which are intended for defense of the Panama Canal. The new ones manufactured will not be entirely identical with those now in service but will, it is hoped, correct the defects which have been found in the existing materiel. In other words, we will improve the loading and ease of operation and especially the sighting apparatus.

We have built and tested a 3-inch and a 4.7-inch antiaircraft gun, both Model of 1920, and these have embodied all of the knowledge obtained during and since the war. It is thought their performance is considerably better than that of anything now in service but neither one is as good as we would like to have it before presenting to the Artillery for their consideration. It is the general rule that as soon as a model is constructed and put under test, features are immediately noted that can be improved. As a result of this there is now under manufacture a new 3-inch antiaircraft unit which to all appearances will be much better than the one now at Aberdeen. This last type is intended to be mounted on a four-wheel trailer and also may be mounted in a fixed position where this is desired. I think

the best ideas about antiaircraft artillery have been incorporated in this new unit, and we are very hopeful it will be good.

As you undoubtedly realize, the best antiaircraft gun is of very little value unless we have a good system of fire control. The system now in use is distinctly a war type and is defective in many respects. Time does not permit discussion of this and you have probably already gone into it more fully. In general the present effort is to provide the simplest kind of gun carriage and use Case III firing. In other words, the apparatus on the gun carriage will consist essentially of an azimuth circle, an elevation scale and a fuse dial. All computing will be carried out away from the firing position. This system involves the perfection of a computing instrument which will calculate the predicted range and position of the target and fuse setting, and transmit these continuously to the gun. Several instruments of this type have been produced abroad. One has been purchased for trial and others investigated. The one purchased is electrical and this is considered undesirable. Frankford Arsenal has under manufacture two of our own type which are mechanical. From among all of these we hope to get something which is satisfactory.

Antiaircraft gunnery is also, as you know, largely a matter of fuses. The ordinary time fuse which uses a powder train is very unsatisfactory as we have so far been unable to evolve any composition which will burn uniformly under the changes in atmospheric conditions and in pressure when firing at high elevation. The rate of burning of the powder train depends very largely upon the pressure under which it burns, which is quite natural, and when firing at high elevations this pressure, of course, changes continuously. Two mechanical fuses have been tried out—one made by the Waltham Company and one made by the Chelsea Clock Company. The Chelsea fuse is promising but not perfected. A number of Waltham fuses are on hand but it is not now under further development. The perfection of these fuses is a very difficult problem. In order to keep our projectiles stable in flight it is necessary to have a certain velocity of rotation as required by the characteristics of the projectile. In order to reach this velocity of rotation the projectile must be accelerated so rapidly that it is very hard to manufacture a fuse which will stand up. Again, high muzzle velocities are desired for it is the general opinion that an aircraft gun should have in the neighborhood of 3000 f.s. This creates more trouble in building the fuse. Firings have recently been conducted at Aberdeen to determine the minimum velocity of rotation which will secure stability,

and we have about decided that the twist of rifling in the 3-inch can be reduced. This will help the action of the fuses.

I know you are interested in the development of mobile artillery, and in this work a very wide field has been covered. In fact it is so wide that I cannot attempt to cover it except in the most sketchy manner, so will only point out the essential differences in our proposed materiel and that now in use. I will do this in the order of increase in calibers, beginning with the Infantry. As you know, the Infantry now uses the 1-pdr. and the Stokes Mortar. Both of these are unsatisfactory; the 1-pdr. in that it is rather heavy and difficult to transport, and at the same time does not have sufficient velocity to penetrate tank armor at moderate ranges, destroy concrete or give a trajectory which has a deep danger space. As you know in your tactical problems, the Stokes Mortar in attack should have a range of at least 2000 yards, whereas it actually has a range of 800 yards, is hard to transport, is not very accurate, and is also somewhat dangerous in its operation. We now have at Aberdeen a 1-pdr. which is much higher velocity than the current materiel, (2000 f.s.) and at the same time the total weight of materiel is about 100 pounds less (25% roughly). In general terms, we are simply trying to make a better 1-pdr. weapon. There are under test at the Proving Ground two types of mortars to replace the Stokes Mortar. One is a 2.24-inch (6-pdr.) mortar and the other a 75-mm. (12-pdr.) mortar. Both of these are mounted on very simple carriages, but are breech loading and rifled. The materiel is broken up into four loads of about 75 pounds each, which can be man-handled. The indications are that either type should be considerably more accurate than the Stokes and will also give the desired range. The Infantry materiel is small in caliber, but is of considerable importance.

Coming next to the divisional artillery, the present 75-mm. field gun has a range of about 12,000 yards with the best projectile we can make. This range is only secured, however, by digging the trail in so that the elevation of the gun can be increased above that ordinarily permitted on the carriage. I may say here that the ranges which I use are the maximum ranges of which the materiel is capable and they must not be confused with the effective ranges at which you are permitted to use this materiel in tactical problems. We have built several models of new 75-mm. materiel both of the split trail type and the box trail type in order that the comparative merits of each may be determined. The trend is apparently towards the split trail carriage in view of the increasing importance of tanks, as the Field Artillery recognizes the importance of having a gun which can sweep over a wide arc of fire without moving the carriage. Of course this

means more complexity in design and from that point of view is objectionable for we can make a more simple and lighter carriage if we use only one trail such as that of the current materiel of French type in use. The materiel of both box trail and split trail type so far tested offer a fair promise of being better than our current materiel, and we hope in the not distant future to secure enough money to build sufficient units for a good service test. These guns will range to 15,000 yards and it is expected the dispersion will be satisfactory. Of course there is no particular value in forcing up the range unless accuracy in fire is maintained.

The 75-mm. gun is used primarily against personnel and the division requires a howitzer of the same mobility which can be used against trenches, reverse slopes, woods, etc, which the 75 cannot properly reach. We had no such howitzer during the war except that, due to force of necessity, the 155-mm. howitzer was incorporated in the Divisional Artillery. It is actually more powerful than necessary. The Germans alone had a really good divisional howitzer. Their howitzer fired a projectile of about 34 pounds to a little over 10,000 yards, and the carriage was very similar in construction to their 77-mm. materiel. We brought back to this country some 600 of these German carriages with about 130 howitzers proper. The Field Artillery has manned one battery already and would like to put more of them into use, but it has not been possible so far, due to lack of funds, to provide ammunition and put the materiel into condition for service.

We have built two types of 105-mm. howitzer and these have been tested by the Field Artillery and returned for further development. We now have under manufacture a second model of the box trail type. This howitzer fires a 33-pound projectile up to 12,000 yards. There is no question that if sufficient funds are available it will be possible to develop an entirely satisfactory howitzer of this type and it will be an invaluable addition to the divisional artillery.

In the way of corps artillery, during the War we used the American 4.7-inch gun and the 155-mm. G. P. F. gun. The 4.7-inch with its range of about 14,000 yards (trail dug in) was underpowered and the G. P. F. with its range of about 18,000 yards and very great weight was much too heavy and immobile for corps artillery. The 155-mm. Schneider howitzer which was used as a corps howitzer, was underpowered although the weapon itself is very good and light for its power.

No one of these three weapons meets adequately the requirements for corps artillery and we are now providing a new 4.7-inch gun and a 155-mm. howitzer. These are mounted on split trail car-

riages somewhat of the nature of the G. P. F. The corps gun has a range of 20,000 yards and the corps howitzer a range of 16,000 yards. They will use the same projectiles as those provided for the current materiel. We have had this corps gun and howitzer under test at the Proving Ground and are now building the second model of the corps gun. The corps howitzer now under test performs fairly well, but it is felt a second effort is desirable. The corps gun has not performed as well, but the model now under manufacture looks to be much more promising. I might say the first design was complicated by the attempt to mount this gun and howitzer on the same carriage. In fact we did the same thing for the first divisional gun and howitzer. This was done for very good reasons and the result has been worth the effort even though not satisfactory.

For the Army or G. H. Q. materiel we used during the war the 155-mm. gun G. P. F., the 8-inch howitzer of British type, and the 240-mm. Schneider (French) type. All of this materiel is actually good although on analysis each has some bad defects. The G. P. F. should for its weight have considerably greater range, and the same applies to the 8-inch howitzers, and in a less degree to the Schneider materiel. There is now under test at the Proving Ground a new 155-mm. gun which has a range of 25,000 yards as against 18,000 for the existing materiel, and the weight is a few pounds less. The new materiel is performing reasonably well and there is no question that continued effort will produce a better type than that now in use. There is also under test a new 8-inch howitzer mounted on a carriage very much like that for the new 155-mm. gun and this howitzer materiel is performing fairly well. It has a range of about 18,000 yards, which you will recall is about 50 per cent greater than that of the service howitzer. The weight of the new howitzer materiel is less than that of the service 8-inch and we are providing separate transport vehicles for both the gun and howitzer. The mobility should be considerably increased by this. In other words, instead of having single loads of about 14 tons we will have two separate loads of about eight tons.

The Caliber Board program requires the development of an 8-inch gun and a 240-mm. howitzer of long range, but due to demands of priority this project is not being actively carried on.

All of the materiel I have been referring to is mounted on wheel carriages, but we have also mounted each of the calibers referred to from 75-mm. to the 8-inch howitzer on various types of caterpillar vehicles. The 75-mm. and 105-mm. on these vehicles

have been tested by the Field Artillery, but I must say the results have not been promising. In other words, this type of materiel has not satisfactorily demonstrated its usefulness. The caterpillar vehicle for mounting the corps gun is now being shipped from the Rock Island Arsenal to Aberdeen. We deferred building this unit for about two years due to lack of funds, but will get a test on it very shortly now. We have had under test at Aberdeen two of the large caterpillars mounting the new 155-mm. gun and 8-inch howitzer. These are now being prepared for service test.

The situation in regard to caterpillar artillery seems to be, briefly, that while one can find apparent advantages in this type of material, such as reduction of road space, reduction in weight of provisions, reduction in time of getting into action under certain conditions, and some other advantages, the final use of this type of artillery depends very largely upon our ability to render it mechanically durable. This has not yet been accomplished, although the progress has been considerable. It might seem to be a simple matter to quickly adapt commercial tractors to such use but as soon as you analyze the problem you will find that for anything bigger than the Divisional Artillery there is no commercial tractor of anywhere near the power or size required, and on top of this demands are made for speed and flexibility which commercial tractors have not yet attempted to incorporate. The whole question is a very involved one.

We are attempting to find commercial tractors for hauling our artillery but the same situation holds. The divisional field is covered very well but even in the field of corps artillery there seems to be considerable question as to whether we can find commercial vehicles of sufficent power within desired weight, and in the field of army artillery no commercial vehicle of any type suitable even exists.

This discussion would not be complete without some reference to pack artillery. We didn't use this during the War although it was proposed towards the end to put some of our old 2.95-inch Vickers mountain guns in as accompanying batteries or guns. It is quite possible, however, under other conditions of warfare that pack artillery would assume a vast importance. Two models have been tested and a third is being built, which we hope will be considerably better than the materiel now in use, which is both limited in quantity and has many defects.

There is a considerable amount of research and investigation going on which is independent of any specific types of materiel, although it may be involved primarily with certain types. For example, we are having a good deal of trouble in determining really

what is the proper form and twist of rifling. A uniform twist is desirable from the point of view of stability of the projectile as it is believed that the constantly changing acceleration caused by an increasing twist causes instability. On the other hand, this uniform twist means that at the beginning of motion the acceleration of rotation is very great. This produces a high pressure on the lands and increases the amount of copper deposited. In the case of firing with some 3-inch antiaircraft guns at the Proving Ground this copper deposit has become very serious after about 250 or 300 rounds. From the point of view of coppering a very low twist is desired. That is to say, in the case of a 3-inch antiaircraft gun about one turn in forty calibers or more, instead of say one turn in twenty-five calibers, but if we reduce the twist too much the projectile loses stability in flight. There are so many conflicting conditions that one is between the devil and the sea on the whole proposition, and there are so many variables involved that in spite of the amount of firing which has been done to date one cannot solve the problem in a scientific manner within the amount of firing which is permissible.

With regard to ammunition we may say in general terms that the trend of development is towards improvement in types and simplicity in supply rendered possible by use of all-purpose fuses.

I will first consider the ammunition for our heavy cannon. A heavy caliber base fuse, which we designate as Mark X, has been developed which functions quite satisfactorily. This fuse will function properly after the projectile has passed through caliber armor and will also function in a 16-inch projectile fired against 1-inch plate. It is believed that this fuse will almost surely detonate projectiles within the interior of a ship, and even should the projectile fail to detonate it will certainly largely accomplish its mission if it passes entirely through. The delay is one tenth second, which causes detonation from 50 to 250 feet behind the armor, depending upon thickness and striking velocity. This fuse is intended for use in all projectiles of 12-inch caliber and above and will be supplied as rapidly as funds are made available. Existing funds provide for the manufacture of about 50,000 of these fuses.

With regard to the projectile proper, the present policy is to supply 100 per cent armor piercing shot. You probably know the reason for this. These projectiles are required to penetrate caliber armor at a minimum angle of impact of 20 degrees except for the 16-inch projectile, which is tested against the heaviest plate available.

It is the present policy to load all projectiles with high explosive at the arsenals as it has been found very much better per-

formance is obtained if projectiles are loaded uniformly to the prescribed density (about 1.48) and this can only be accomplished where suitable presses are available. Loading projectiles in this manner to a high density will tend to insure penetration before detonation and reduce the chance of premature in the bore.

There is nothing very spectacular being done in the way of improvement of design of heavy projectiles. For the old type armament of short range the need of improved design of projectiles is not so important. In the case of projectiles being supplied for the new armament, we are, of course, incorporating everything which has been learned about proper design and processes of manufacture, and all new projectiles will be the best it is possible to make both as to quality and as to design.

One general characteristic of our new heavy caliber projectiles is that they are somewhat lighter than what we considered desirable a few years ago. In this respect we are more nearly approaching the navy practice, which has projectiles even lighter. Of course you know the navy has always considered a flat trajectory very desirable and this is one of the reasons why they have used the light projectile.

In the way of powder, efforts have been devoted principally to improvement in the methods of manufacture of the present service powder, and we are trying to determine whether it will be practicable to use FNH powder in seacoast and railway artillery cannon and in the 3-inch antiaircraft. It is also proposed to investigate the use of FNH powder in the G. P. F. gun.

There has been a good deal of talk about wonderful improvements in the range of our projectiles. It should be understood, however, that there has been no spectacular stunt. There has been a very marked improvement in range, with which we are greatly gratified, but this increase has been obtained by close analysis of firing records and attention to small details of design. Using a long ogive undoubtedly reduces the air resistance, boat tailing has further reduced this air resistance, and the correct design and location of rotating band has helped further. Improvement in the band has in some cases greatly reduced the dispersion. All of these features are very intimately related with each other and the correct combination is by no means a finished art. It is necessary to determine by experiment the characteristics of each projectile which we build, but we are able with our present knowledge to make a pretty good guess on the first effort.

The principal problem in development of antiaircraft ammunition is, of course, the fuse, and I have already referred to this. Development is being carried on along two lines; first, to provide a

good mechanical fuse, and second, to find out how much better the powder train time fuse can be made. Different powder compositions have been tried out and a fuse is being developed which will always burn under a constant pressure. This work is in a very preliminary stage. The Chelsea Company has an order for a small lot of mechanical fuses and these are being supplied in groups and tested successively so that improvements can be incorporated as the work proceeds. We also hope to secure certain mechanical fuses which are made abroad, and it is possible these may give good results.

With regard to ammunition for mobile field artillery, the status with regard to improvement in the design of projectiles is about the same as I have already indicated. If Model 1902 ammunition were fired in the Model 1921 75-mm. gun a range of approximately 11,000 instead of 15,000 yards would be reached.

It has been possible through tests to eliminate many of the types of point detonating fuses which were under development, and development has been reduced to work on the so-called AB No. 3 and E-13. It is hoped that experience with these two will finally enable us to select the E-13 as our standard all-purpose fuse for mobile artillery ammunition. This fuse is a combination super-quick and short delay fuse.

We are trying to improve the super-sensitive fuse which is used with the 37-mm. In firing against aircraft a fuse which will detonate the projectile on impact with the lightest fabric encountered is very important. A fuse of this type was used during the War, but is by no means satisfactory. We are now manufacturing 2000 of these super-sensitive fuses which will be given a service test. It is believed this new fuse is a distinct improvement over the old one.

You are familiar with the use of false ogives on seacoast projectiles. It has been determined that the range of many of the service types of field artillery ammunition can be increased by the use of false ogives, but the use of such devices is accompanied by increased dispersion. It is hoped that this fault can be corrected by further investigation and experiment. As I indicated above, increase in range is not of much value if our dispersion is bad, but it is felt that in all of the new projectiles dispersion can be held within reasonable limits even at the long ranges now being attempted.

For field artillery ammunition we used during the War both TNT and Amatol. These were reasonably satisfactory but these war-made explosives undergo a certain degree of deterioration in storage, thereby becoming less efficient. We are trying to find a means of correcting this by suitable changes in the methods of manufacture or by the development of a better explosive.

Tetryl is now used as the booster explosive for ammunition. Tetryl made during the War has shown some indications of deterioration and there are no existing facilities for the manufacture of this explosive. We wish to develop some suitable substitute for Tetryl which can be manufactured in quantity from readily available raw materials. One improved method for manufacture of Tetryl has been developed on a laboratory scale and we are negotiating for manufacture of experimental lots of improved Tetryl. A new explosive designated as Cyclonite, which offers promise as a satisfactory substitute, is under investigation.

"In abundant measure he has displayed the four essential qualities of loyalty, skill, courage and force of character."

"Instead of bringing his professional life to an end when he returned from France amid the applause of his fellow countrymen, he has served the country faithfully since 1919 as he had always done before. To him, more than to any other one man, is due the credit for the fact that we have not sunk into that military lethargy which has followed all our other wars. So far as plans go, he has made the Army ready for the future."—*Stated by the Secretary of War, in speaking of General Pershing, at Army War College Sept. 2, 1924.*

Railway Artillery Development Since 1918

By Captain G. W. Ricker, C. A. C.

DURING the period of the war and just after it there were published in The Journal a number of papers dealing with railway artillery in seacoast defense. The subject has commanded much attention and it is believed that the following account of some of the developments, difficulties and problems during the time that railway artillery has been a part of our coast defense system will be of general interest.

The general types of our railway mounts are familiar to most Coast Artillerymen but a brief mention of the types best suited for use in coast defense may be in order. Speaking in very general terms it may be said that there are two types, first the "girder" mount, so-called for want of a better term, because the car body proper consists essentially of two steel girders of great size and strength. On mounts of this type we have guns of major caliber and great range, the 12-inch Batignolles (modified to fire from the 10-inch D. C. base ring), the 14-inch Model E and the 14-inch Model 1920. The 14-inch Model 1920 mount is so constructed that it may also be used with a 16-inch howitzer. Mounts of this type are emplaced for all-around fire on concrete gun blocks or on circular field platforms. When the gun block must be constructed emplacement is obviously slow, but in a previously prepared position it may be accomplished very rapidly. The trucks of these mounts are removed for firing. Organization tables provide for two guns of this type to a battery.

The other type is the "drop platform" or "outrigger" mount. On this type are mounted the 7-inch Navy gun, the 8-inch gun, Model 1888, the 12-inch mortar Model 1895, and the 12-inch howitzer. These mounts are emplaced for firing upon ground platforms composed of steel H-beams and wooden cross ties. The car body is jacked up to allow the placing of the beams and cross ties and is then lowered so that the entire weight rests upon the platform. The trucks are not removed, but are relieved of all weight. The horizontal component of the force of recoil is taken up by eight outrigger struts whose ends bear upon wooden floats embedded in the ground. The average time of emplacement is about two hours. The rolling

and sliding types of mounts are not considered suitable for general use in coast defense. For laying in range all types are equipped with elevation quadrants whose least reading is one minute. For laying in direction all mounts are provided with panoramic telescopes so mounted that errors of direction due to inclination of the trunnions are automatically corrected. The 8-inch mounts also have adjustable base ring azimuth circles graduated in degrees. The 12-inch mortars have azimuth circles graduated in mils, but non-adjustable. None of the other mounts are equipped with base ring azimuth circles.

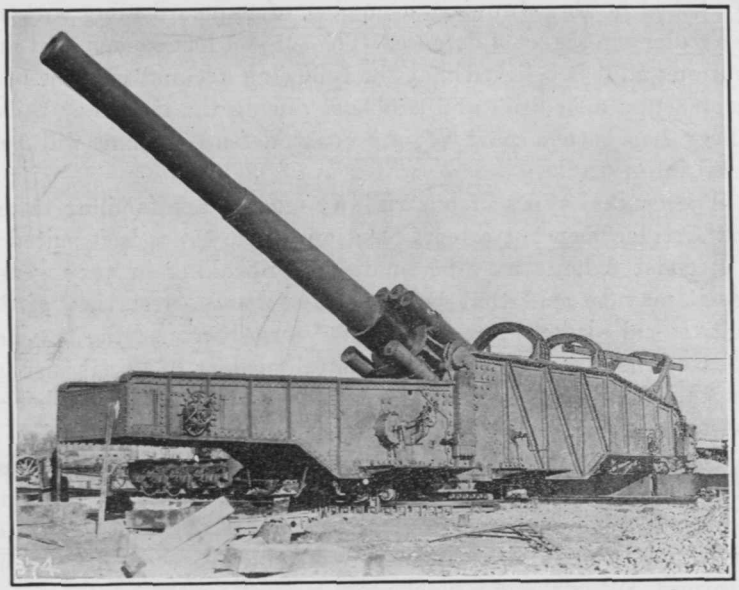


FIG. 1

14-INCH RAILWAY MOUNT, MODEL E

In 1919 when the attention of the Army was turned from demobilization to peace time training and development, we had plenty of railway guns but nothing definite in the way of means and methods of using them for fire at moving naval targets. Of course, the fundamental principles governing such fire apply equally to fixed and mobile cannon. Railway batteries, as well as fixed batteries, must be able to open effective fire against any target within range and to sustain such fire at a maximum rate. The measure of effective fire is the same, hits per gun per minute. Railway batteries must not only be able to accomplish all that is expected of fixed batteries, but much besides. As mobile units, and mobility is one of their most valuable qualities, they must be able to occupy any suitable position any-

where and to change positions as often as necessary and as rapidly as possible. In occupying a new position there is always an unavoidable loss of time, due to the necessity for reconnaissance, orientation, establishment of communications, and emplacement of the guns. When these tasks have been accomplished, however, the battery should be ready to fire, so fire direction methods and equipment should not only be adaptable to all situations, but quickly adaptable, else there will be undue loss of time, for plotting car materiel cannot be set up and oriented to conform to a given situation until the work of field orientation has been completed. To maintain effective fire at a maximum rate calls for methods and apparatus capable of producing accurate results and producing them rapidly. These considerations give us a general idea of the chief problems of railway artillery fire direction in seacoast defense.

FIG. 2
7-INCH RAILWAY MOUNT ON MODEL 1918 CAR

DEVELOPMENTS TOWARD A STANDARD SYSTEM OF FIRE DIRECTION

Attention was first directed toward the development of a standard system for use within the limits of visual range from shore. Naturally enough recourse was had to one of the fundamental systems in use in the fixed defenses, the horizontal base. This was modified to include the use of range and azimuth prediction boards. This system has been widely used and needs no description here. Figure 3 shows a schematic diagram which indicates the plotting car organization of an 8-inch railway gun battery using this system; it indicates also the equipment used, and shows the flow of data. A complete discussion of a system similar in most respects may be found in THE COAST ARTILLERY JOURNAL for June, 1920. Systems

of this type were used by all batteries of the railway artillery brigade for a period of about a year and a half. During this time the 42nd Artillery made a trip through New England, conducting extended maneuvers and holding many service practices at moving targets at Rockport and Provincetown, Mass. Many practical

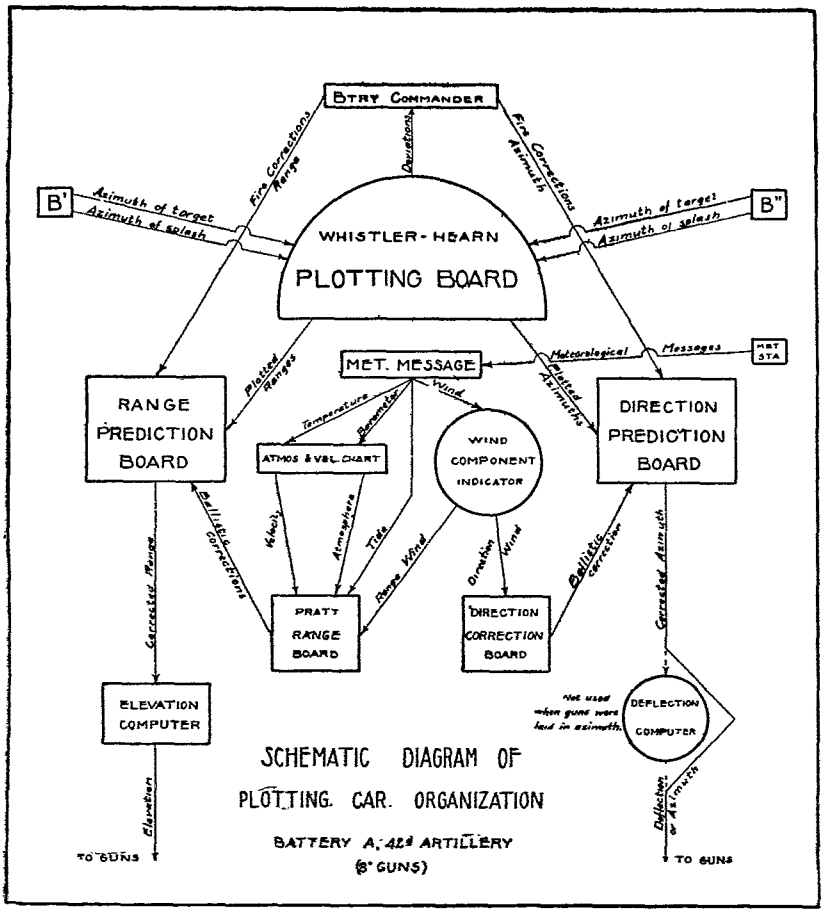


FIG. 3

problems under field service conditions were encountered. It may be seen from the diagram that there was no provision for supplying a separate set of data for each gun of the battery, nor was there any convenient means for determining and introducing gun difference corrections. This difficulty was avoided by placing the guns so near together that the errors due to gun difference could be neglected. In some instances small "closing" azimuth corrections were applied. As

we had batteries of four guns each, it can be seen that, had we followed the generally accepted doctrine of having a wide dispersion between the elements of a battery, our gun difference problem might have become very complicated. It is only fair to state that the limitations of our fire direction system were not the only consideration, for we were on private property, and could not have spread the batteries out very much anyway.

I hardly need mention that the Whistler-Hearn plotting board was not at all suited to the needs of mobile artillery. Practically every change of position made it necessary to re-graduate the main azimuth circle and the gun arm azimuth circle. The occasional necessity of changing from a right to a left hand base line involved awkward complications. The displacement of the battery from the primary station frequently exceeded the adjustment limits of the gun arm center, and there were other difficulties of a similar nature.

As I have indicated in the diagram, provision was made to furnish either deflection or azimuth to the guns. In the 42nd, we usually used azimuth, laying the guns in direction by means of the adjustable azimuth circle on the base ring. As mentioned earlier, this is not as accurate a method as using the sight because there is no compensation for errors due to any inclination of the trunnions, but it did avoid the problem of deflection conversion. With a four-gun battery this question of deflection may become very much involved, for the same aiming point may not be visible from all guns; if aiming rules are used, it may not be possible to place them all in the same direction from their respective guns; or, it may be necessary, or desirable to use aiming points for some guns and aiming rules for the others. Under any of these circumstances the deflections of the different pieces may differ from each other by many degrees and it will be almost impossible to compute the data on a single device in time to be of any use. To use a separate deflection computer for each gun is undesirable.

It is well known that the method of predicting future range and azimuth by means of the rates of range and azimuth changes on the prediction boards involves the erroneous assumption that these rates of change are constant during the observing interval plus the predicting interval plus the time of flight. This is true only when the target is moving in or out on a line radiating from the battery, or when the target is moving on the arc of a circle of which the battery is the center. The errors due to this assumption vary; for gun batteries under the conditions of a conventional target practice they are negligible; for mortars under similar circumstances they are usually small but are worth considering. Under service conditions

with fast moving targets they may be of considerable magnitude, especially for the mortars. Plotting the rate of change as a curve instead of a straight line (the usual practice) and making a proper curve prediction will minimize the error, but it is difficult to train the average prediction board operator to do this correctly. The subject of prediction board errors was discussed in an article by Major John S. Pratt in THE COAST ARTILLERY JOURNAL for December, 1922.

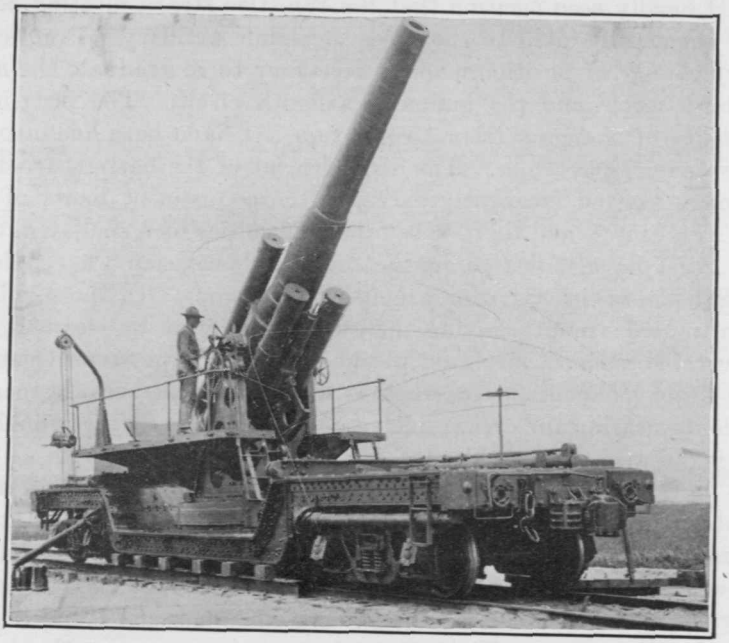


FIG. 4
8-INCH RAILWAY MOUNT, MODEL 1918

From the point of speed of computing data this system was satisfactory, corrected data were usually sent to the guns in less than twenty seconds. It was also simple and orderly in operation. As indicated in Figure 3 deviations were determined by plotting splashes on the plotting board. This was made feasible by the fact that the plotter, relieved entirely of the task of predicting, had very little to do, and consequently had plenty of opportunity for measuring deviations. In order to do this it was necessary to locate the target at the instant of impact, and with a little practice he was able to do this by eye, closely enough for all practical purposes. This method sometimes caused confusion when deviations were in process of being measured at the instant of a data bell, but this could usually be avoided. One serious objection was that errors in location of the

setforward point were not known or ascertainable by the plotter, so deviations were always calculated with respect to the location of the target, and not with respect to the setforward point which is the proper procedure.

It should be mentioned that since the time of which I write there has been devised by Major J. C. Haw a means of reading corrected deflection from the azimuth prediction board without necessity for conversion. See Coast Artillery Board Notes in THE COAST ARTILLERY JOURNAL, October, 1923.

We had much experience with the prediction board system and, though subject to difficulties of the sort I have mentioned, it did work, so, with much of our time taken up with other problems such as transportation, orientation, and communications, we were, for the time being, inclined to let well enough alone and be satisfied with a system which, though far from perfect, could produce results.

In the summer of 1921 the 30th Brigade was consolidated into a single regiment, the 52nd, and a complete reorganization took place. Among other changes was the discarding of the range and azimuth prediction boards, and a reversion to the Case III system prescribed for major caliber batteries by the Coast Artillery Drill Regulations, which were followed as closely as local conditions and differences in materiel would permit. The chief reason for this action was the inherent error in the method of predicting by means of range and azimuth prediction boards, and the desire for a system by means of which personnel could be better trained in the attainment of that high degree of precision which is such a vital necessity in good artillery fire. It was not thought, even at the time of the change, that the standard system of the fixed defenses was particularly well adapted to the solution of the problems peculiar to the railway artillery, but it was felt that it was a system proved sound by long experience, that it would, for the time being, best serve the purpose for training in accuracy of fire, and that it would afford a good foundation for future developments. The equipment used was, in general, unchanged except for the omission of the prediction boards.

As the prediction was accomplished on the plotting board in the usual manner it was no longer practicable to plot splashes and measure deviations thereon, and other methods were used. I shall mention these later in connection with spotting.

Gun difference corrections were handled in a systematic manner by the use of difference charts of the general type often used in the fixed defenses. In the reorganization, batteries had been reduced to a strength of two guns and for these the difference charts did well enough, the only objection being that a new chart had to be made

for each new position. To make and use difference charts for a battery of four widely dispersed guns having large variances in deflections would not have been so simple a matter.

Various attempts were made to provide a convenient means of converting azimuths to deflections. The best of these was a combination elevation-deflection board. On this board, operated by one man, were accomplished the following: (1) wind and drift corrections were introduced, (2) fire corrections were introduced, (3) corrected azimuth was converted to deflection, and (4) corrected

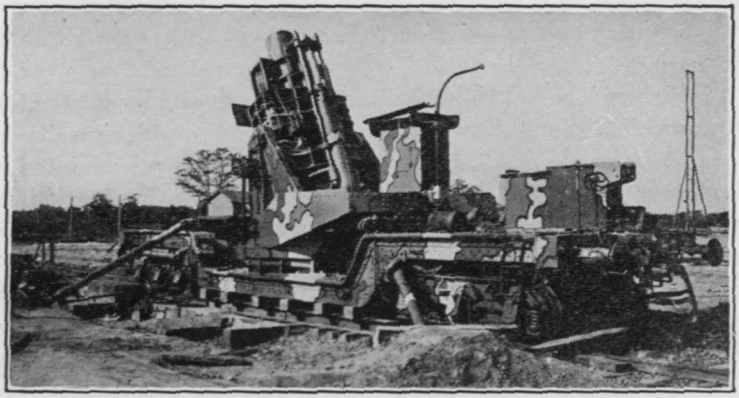


FIG. 5

12-INCH MORTAR RAILWAY MOUNT, MODEL 1918

View from the left rear of the mount with Mortar at maximum elevation. Showing in detail method of placing outriggers and firing platform. While the Mortar is here shown pointing along the track, it may be fired equally as well at any angle therewith

range was converted to elevation. The difficulties incident to the construction of home-made apparatus made it impracticable to make deflection conversion scales for this device that were of universal application, so it was necessary to make new scales for every change of position, and for any change of aiming point or of the direction or of the aiming rule. In one battery it was attempted to avoid the necessity for deflection conversion by graduating the gun arm azimuth circle of the plotting board to read deflection. To do this it was also necessary to graduate the wind component indicator to correspond and to convert the ballistic wind direction into deflection before using it. This was no nearer to being a real solution of the difficulty, for, obviously, the gun arm azimuth circle graduations applied to one aiming point only and any change would render the system inoperative until the circle had been re-graduated to conform to changed conditions.

The C. A. D. R. system was used for about a year. During this time especial emphasis was laid upon the necessity for care and precision in the operation and adjustment of all materiel. Much time and attention were devoted to analysis of drill and target practice. The deficiencies of the system became even more readily apparent, particularly the lack of a universal plotting board, of a universal method of handling gun difference corrections, and of a universal means of deflection conversion.

While peace time organization tables provided for only two guns per battery, war strength tables still called for batteries of 8-inch guns and 12-inch mortars of four pieces each. Attention was therefore concentrated upon these problems with the idea that satisfactory solutions must be suitable to the needs of four-gun batteries.

One battery experimented with a 110-degree plotting board and considered it to be an improvement over the Whistler-Hearn. Its simple and rugged construction, its freedom from a multiplicity of gears and the consequent lost motion, its ready adaptability to either a right or left hand base line, its comparatively small size, and above all, its characteristic of plotting through 360 degrees, were great advantages, but the necessity for different couplers for varying lengths of base line (adjustable couplers were apt to cause interference), and the difficulties in re-setting station sleeves for each new position, caused it to fall short of being a universal plotting board.

The plotting board problem was solved in the fall of 1922 by the adoption of the Cloke plotting board, brought about by the circumstance that Colonel H. E. Cloke, its inventor, took command of Fort Eustis at that time. It was well known that Colonel Cloke had devised a successful plotting board that was radically different from standard types, but its especial suitability to the needs of mobile seacoast artillery had not been realized. There is no need to describe the board here, a complete description may be found in the April, 1923, number of THE COAST ARTILLERY JOURNAL. Its outstanding advantages are that it can be oriented for any position and any length and direction of base line in less time than it takes to write these words, and that it may be used to furnish re-located range and azimuth for each gun of a battery, no matter how widely the guns may be dispersed. The value of the Cloke board to a railway battery can hardly be over-estimated.

The question of deflection conversion was approached from a new angle, and Major F. Q. C. Gardner and Lieutenant F. W. Gerhard hit upon the happy scheme of eliminating the difficulty at its source by modifying the panoramic sight itself. This modifica-

tion was the removal of the azimuth circle of the sight and the substitution of one graduated in the opposite direction, and adjustable to any position. The use of this modified sight is as follows: the gun is bore-sighted on a point of known azimuth, the sight is then laid on the desired aiming point or aiming rule and the adjustable azimuth

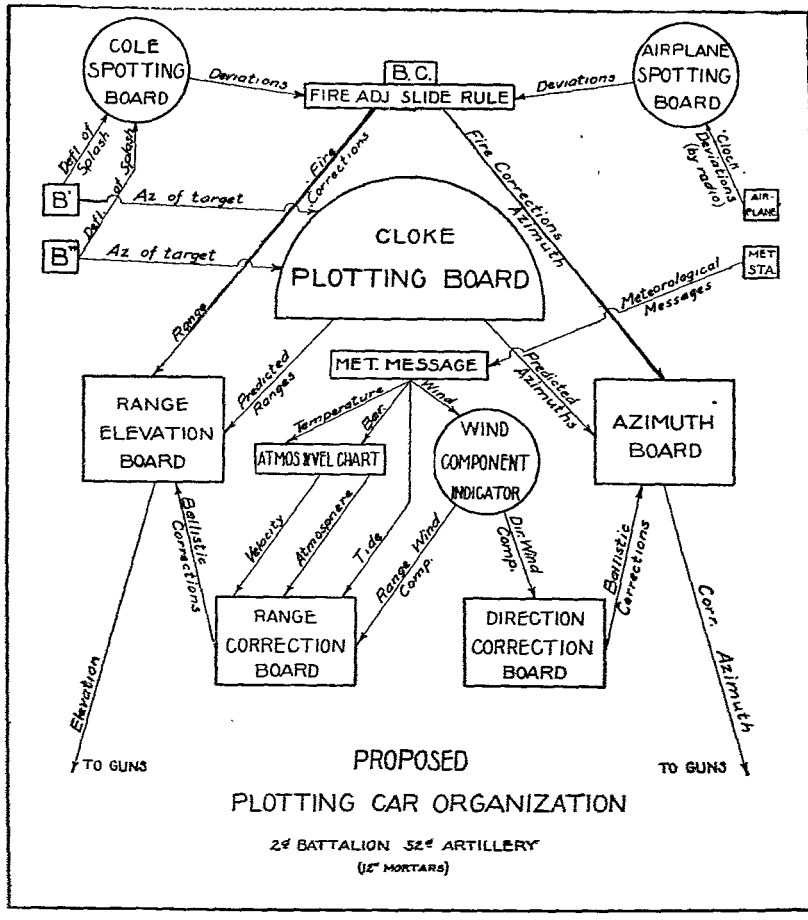


FIG. 6

circle made to read the azimuth of the point on which the gun is laid. The azimuth circle is then locked in place and orientation is complete. Laying the sight on the aiming point with a given azimuth will point the gun in azimuth. No deflection correction or conversion is necessary. In case it becomes desirable or necessary to change aiming points or to move the aiming rule, it is the work of only a moment to make the necessary adjustment of the sight azi-

muth circle in the manner indicated above. In case there is no convenient point on which to bore sight the gun it may be pointed down the track and the sight made to read the azimuth of the track when laid on the aiming point. Under any of the old methods it was impossible to change the direction of the line of aim without serious delay. Even with a universal deflection board it would be necessary to determine the direction of the new aiming point from the gun before firing could continue, unless of course, this direction were already known. With the modified sight it is necessary to know

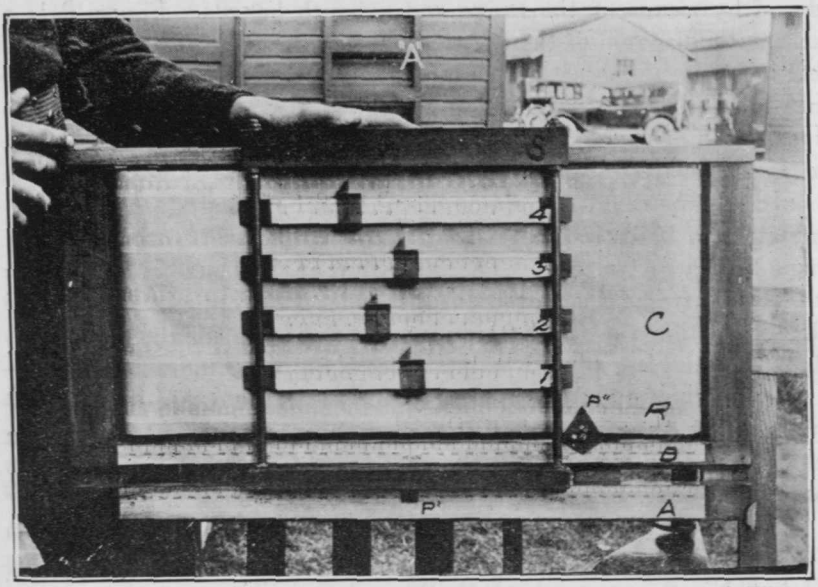


FIG. 7

only one line of direction from the gun in order to orient on any suitable aiming point. The advantages of this are very great. I can recall two target practices which nearly failed of completion when the aiming points in use became obscured by mist. In one instance it was possible to place an aiming rule on the line of sight just before the aiming point disappeared entirely. In the other it was not possible to use an aiming rule and the battery commander was forced to the crude expedient of driving a nail in the roof of a nearby ammunition car on the line of direction to the aiming point. This method was feasible in this particular situation only because firing was at a fixed target and lateral fire adjustment had been completed. Had this battery been firing at a moving target it would

have been necessary to suspend firing, determine the direction of a new aiming point and make corresponding changes in the deflection scales.

The use of the Cloke plotting board and the modified sight required the computation of a separate set of data for each gun. This was simplified by determining ballistic corrections in the usual way on the basis of the uncorrected range and azimuth from the directing gun, and applying them as group corrections, i.e., to all guns. Fire corrections were applied by group corrections or by individual gun corrections as necessary. All corrections were introduced by means of the range and azimuth boards. Figure 6 is a schematic diagram of the plotting car organization for the batteries of the 12-inch mortar battalion, using aliquot part charges and the new mortar range table. Figure 7 shows a range board for the introduction of range corrections. This device has been called simply a "range board" to distinguish it from the Pratt range correction board and the range correction board Model 1909 used for the determination of ballistic corrections; "elevation board" would probably have been a better term. The operation of the board is as follows: the sliding frame S is moved until its index P′ is opposite the desired fire correction for the battery on scale A; the pointers on slides 1, 2, 3, and 4 are placed to introduce the proper individual corrections for each gun; the lower pointer of the movable index P″ is placed over the proper ballistic correction of scale B; the rolling chart C is then moved until the uncorrected range of gun No. 1 on scale R appears beneath the upper pointer of index P″; the pointer of slide No. 1 will then indicate on the chart the corrected elevation for gun No. 1. The chart is then moved till the uncorrected range of gun No. 2 appears beneath P″ and a similar operation is performed for each gun. The successive settings of the chart C that are necessary are a disadvantage in the use of this device. A board of similar construction is used in a similar manner for the introduction of direction corrections.

Both batteries of the 3d Battalion (8-inch guns), firing four guns each, held successful practices in the fall of 1922. These were the first practices held using the new methods and equipment just described and the advantages of the new system over methods previously used were so readily apparent that the Cloke board was adopted as standard equipment for railway artillery.

In adapting this system to the needs of the mortar batteries, the time element in computing four separate sets of data offered some difficulty. The average time of computation for a single piece was about twenty seconds, but for four pieces it was found to be from forty to

forty-five seconds due to the delay involved in making four successive settings of the primary arm on the plotting board and in the four successive settings necessary on the range and azimuth boards. This left only fifteen or twenty seconds for the setting of data on No. 4

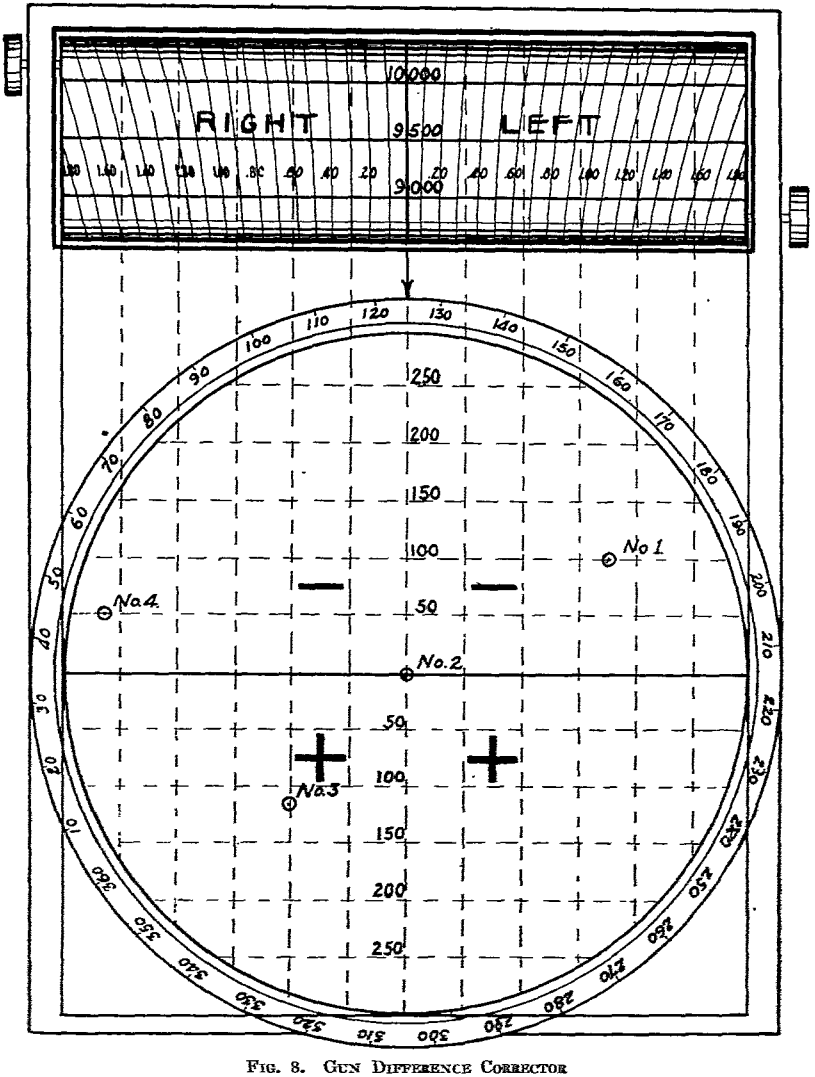


FIG. 8. GUN DIFFERENCE CORRECTOR

gun. With the 8-inch guns this was usually ample time, but the mortars are slower of operation and it frequently happened that No. 4 was pressed for time. This difficulty was met by reverting to the method of taking from the plotting board for a directing gun

only and introducing gun difference corrections on the range and azimuth boards. The determination of the amounts of these corrections was accomplished by means of a universal gun difference corrector devised by Captain T. J. Betts. (See Figure 8). This device consists essentially of a disc graduated about its circumference in azimuth, and a rolling chart on which are plotted at their respective ranges curves of the natural tangents of angles varying by ten one-hundredths of a degree right and left from the line of direction. On the disc are plotted the gun positions with reference to the directing gun which is always placed at the center. The disc and rolling chart are mounted as indicated on a box of convenient size. The index arrow is fixed and is an extension of the center line of the chart. Over all is a sheet of transparent celluloid bearing a 50-yard grid, indicated in the sketch by broken lines. The operator receives from the plotting board the approximate setforward range and azimuth just before the predicting bell. He rolls the range chart so that the setforward range appears in the window and turns the disc so that the azimuth is opposite the index. Range corrections are read by means of the grid, being plus or minus as indicated thereon. Azimuth corrections are read on the chart at the intersection of the proper range line with the vertical lines of the grid through each gun position. Necessary interpolation is by eye. It is usually convenient to use one of the more centrally located guns as the directing piece. In the example in the sketch No. 2 is the directing piece; the setforward range and azimuth are 9500 yards and 125° respectively; the gun difference corrections are then:

No. 1 gun	—100 yards	left 1.°08.
No. 2 gun	no corrections	directing piece
No. 3 gun	+115 yards	right 0.°60.
No. 4 gun	— 50 yards	right 1.°60.

Range corrections are called out to the range board operator who sets his gun slides accordingly. This is done *before* the uncorrected range from the directing piece is received from the plotting board, so that when this datum is received, the range board operator has only to make a single setting of the rolling chart "C" (see Figure 3) and he is ready at once to read corrected elevations for all four guns. Introduction of azimuth corrections for gun differences is performed on the azimuth board in a similar manner. The use of this device resulted in a saving of about fifteen seconds in the computation of data, and gave results as good as the method of relocating for each gun on the plotting board. The device is universal.

For a change in position it is only necessary to replot the gun positions on the disc which is the work of only a few moments. It was used successfully in drill but was not used in target practices last spring because the batteries did not have enough men to man four mortars, and for batteries of only two pieces re-location on the plotting board is quite rapid enough and is believed to be simpler.

The system of fire direction described above and outlined in Figure 6 has been used with good results during two target practice seasons. It is believed that within the limits of visual range from short, this system represents a practical attainment of the standards suggested early in this discussion. Within the aforesaid limits, the methods and apparatus are universal. Using this system, a battery with its guns emplaced and communications established should be able to fire in half an hour after orientation data is furnished. I doubt if a battery using any of the other systems we have tried could get ready to fire in a day. The methods and equipment are accurate in theory and have given good results in practice. The speed attainable is best shown by the fact that in service practices held last spring Battery F, 52nd Artillery, firing two 8-inch guns, fired 57 shots in 37 minutes, and Battery C, with two 12-inch mortars, fired 35 shots in 36 minutes. The maximum rates of fire for these weapons are considered, in the light of four years experience, to be one shot per gun per minute for the guns and one shot per gun per two minutes for the mortars.

Emergency Methods of Fire Direction

Very little has been accomplished in the way of working out ways and means for emergency fire direction chiefly because all attention has been centered upon solving the problems of a standard system. One experiment along this line was made last spring when Battery E held a service practice in which ranges and azimuths were determined by the use of a self-contained horizontal base range finder. The instrument was found to be inaccurate except at short ranges but the method was considered satisfactory for use in an emergency.

In considering the question of emergency methods it should be borne in mind that the flexibility of the Cloke board is such that a battery whose observing stations were out of action could "borrow" data from any battery in the vicinity that could still observe, by the simple expedient of orienting its board to conform to the base line of the observing battery. The Cloke board is a universal re-locating device.

The question of emergency methods is one that should receive more attention in future developments.

Fire Direction Beyond the Range of Vision From Shore

This is the great problem of all long range seacoast artillery. As part of the joint training maneuvers of the Coast Artillery Corps and Air Service in the fall of 1922, a railway battery successfully fired a 14-inch gun at a moving target at sea with no other data for firing than that furnished from an observing airplane. (See The Coast Artillery Journal for January, 1923—"Position Finding by Airplane.") At present this seems to be the only method by which practical results against targets beyond visual range from

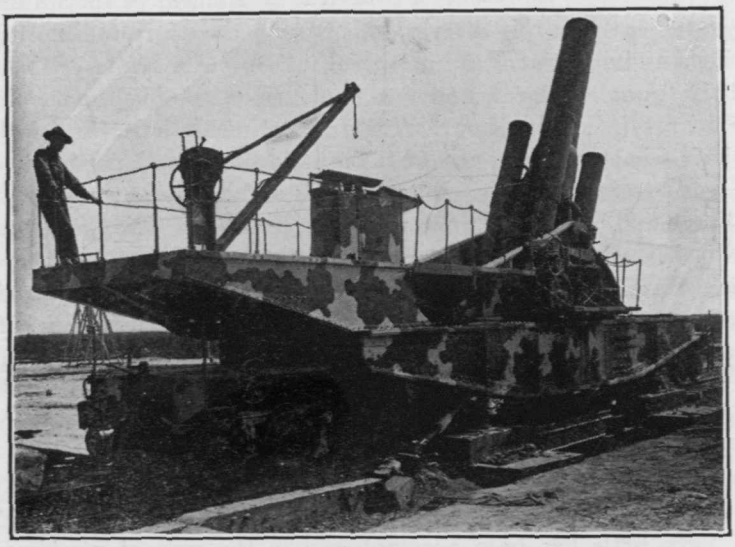


Fig. 9

16-Inch Howitzer, Railway Mount, Model 1918

shore may be obtained. It is by no means a universal method for it breaks down unless the visibility is such that the aviator can see both target and splashes. It pre-supposes that the observing airplane can keep the air and maintain efficient radio communication with the battery.

Spotting and Fire Corrections

The question of spotting and the determination of deviations and fire corrections is in no way different for railway artillery from the same question with respect to fixed seacoast artillery. A few methods a bit out of the ordinary have been used, however, and some of these are very interesting.

In spotting the usual method has been the use of terrestrial stations with bilateral observation. Standard types of plotting boards, various kinds of spotting charts, and the Cole spotting board

have been used at different times for measuring deviations. The Cole board has been the most generally satisfactory when deviations were not excessive. These devices and methods are all familiar to JOURNAL readers.

We made a number of experiments with balloon and airplane spotting but up to 1922 no really satisfactory results had been obtained. The fault, I think, was chiefly our own. We were inclined to distrust the dependability of aerial observation. Terrestrial observation was always available for target practice, so naturally we placed our reliance upon it and paid but scant attention to the data reported by balloon or airplane observers. Also we desired airplane observers to report splashes over or short and right or left with respect to the gun-target line, a very difficult thing for them to do. The joint Coast Artillery-Air Service maneuvers of 1922 did much to bring about a better understanding on the part of each branch of the problems of the other, and led, among other things, to the use by the railway artillery of the "clock code" method of observing fire on moving naval targets.

This method has two applications, one when position-finding is also by airplane, already mentioned, and the other when position-finding is being done in the usual way from terrestrial stations while the fall of shots is being reported by an airplane observer. In both applications the aviator's work is the same. He considers the target to be in the center of an imaginary clock face, moving in the direction of 12 o'clock; 3 o'clock is due starboard, 9 o'clock due port, and 6 o'clock dead astern. The line of fire does not interest him unless he should happen to get in it. He also considers the target to be at the center of a series of concentric circles, whose radii of 25, 50, 100, 200, 300, 400 and 500 yards are lettered Z, A, B, C, D, E, and F respectively. Circles whose radii are from 600 to 1200 yards are lettered FB, FC, FD, and so on. The deviations are reported by the circle letter and the clock direction, as "C-4," i.e., 200 yards away at 4 o'clock. This method gives surprisingly good results. It is possible to tell "clock direction" very closely, and the observer has always before him an approximate scale to help him in the estimation of distance. In target practice he knows the length of towline and in action the length of the enemy vessel would serve the same purpose. In several target practices, I have fired a total of 69 shots using this method and adjusting fire on the aviator's reports. Not a shot was lost, not one was reported in a wrong direction, and a satisfactory adjustment was attained in each case. Several other practices of this sort produced equally good results. Reports from Corregidor indicate excellent results there by the use of different methods.

Truly it seems that observation of fire by airplane observers is one of the most promising methods, for it is quite possible that our ground observers may be able to track a target but unable to pick up splashes that would be visible from a plane. As I have said before it seems to be the only practicable method for controlling fire at ships beyond the horizon.

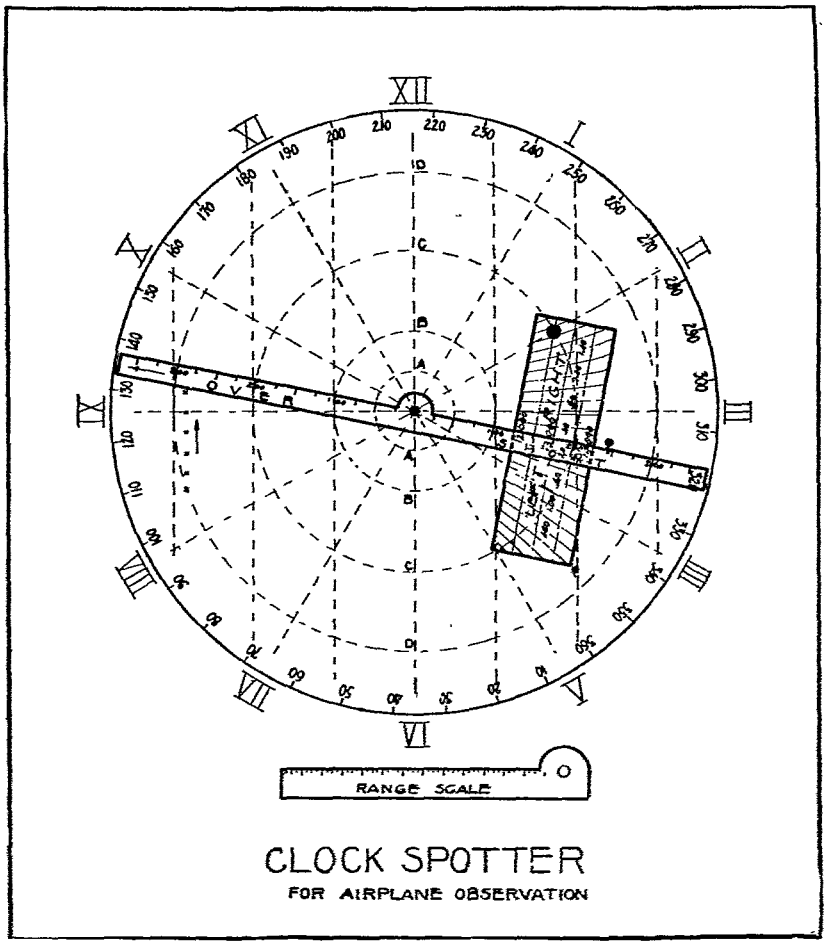


FIG. 10

When the "clock" method is used in conjunction with tracking by terrestrial observers some device is necessary to convert the "clock" deviations to deviations with respect to the gun-target line. Figure 10 shows a device that has been successfully used under such circumstances. It consists of a board bearing clock numerals, radial

lines of clock direction, a series of parallel vertical lines, and the concentric lettered circles previously mentioned (all shown by broken lines). Mounted on a central pivot pin is a disc of celluloid or xylonite with its rim graduated in azimuth. It is well to use the sketching celluloid, the lines on the board will show through it and plotting may then be done with a pencil. If shining celluloid or xylonite is used plotting must be done with pen and ink. Two xylonite scales are provided, one a range scale (shown detached in the lower part of the figure) which is graduated in ranges at any convenient scale, and the other a deviation scale graduated in yards over and short, scale usually 1 inch = 100 yards. On both the "over" and "short" arms of this scale and perpendicular to it are scales for measuring lateral deviations. They bear curves representing deviations in angular measure at various ranges. (Only one of the lateral deviations scales is shown, to simplify the drawing.)

Two operations are performed on this device; the first is to make a plot of the course of the target. In doing this the pivot pin represents the gun position and the course is plotted by means of the range scale and azimuth circle as the operator hears range and azimuth called out from the plotting board. When he has plotted several points he marks a small arrow to indicate the direction in which the target is moving and revolves the disc until the track (with the arrow pointing *up*) is parallel to the vertical lines. The disc is then oriented until the target changes direction. When this occurs the "dead" track is erased and the disc turned to make the new portion parallel to the vertical lines. The azimuth of the course may be read opposite the numeral XII on the clock face. When a shot is fired the "over" arm (marked with an arrow) is brought to the setforward azimuth and the device is ready to determine the deviation. When the radio message is received from the plane the splash is plotted according to the circle letter and clock direction and the deviation read at once by means of the longitudinal and lateral scales. In Figure 10 the plotted course is indicated by the series of small crosses; the setforward azimuth is 137 and range is 12,500 the radio message is "C-2" (plotted in the sketch as a heavy black dot); the deviation is therefore "short 150 yards and right 1.°90." Using this method deviations were frequently determined within 5 seconds after the splash and always within 10 seconds. A convenient and practical size for this spotter is from 20 to 24 inches in diameter. It is, of course, possible to dispense with the operation of plotting the track of the target on the spotter by having the plotter determine the azimuth of the target's course on the plotting board by means of a protractor.

Experiments with balloon observation of fire have not been so extensive nor have they given much promise of success, for the balloon observer, despite his great altitude, has still the perspective of the ground; he must report the deviation as so much right or left and his report must be re-located, taking into account his position, before it can be used. The airplane observer, on the other hand, has

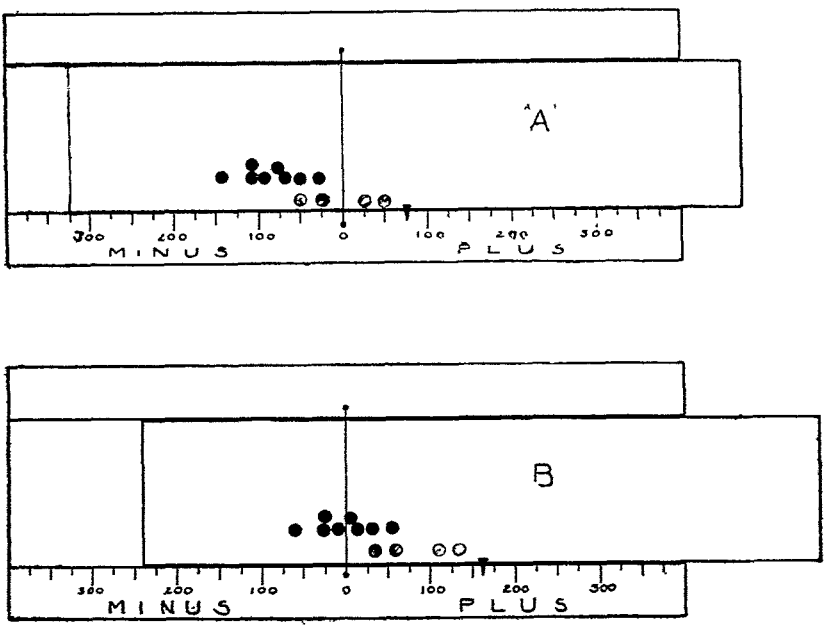


FIG. 11

the perspective of the third dimension, and can report the deviation as such a distance away and in such a direction. At Provincetown in 1920 bilateral balloon observation was available during much of the firing. The results were far from dependable, due partly to the difficulty in observing on a moving target from so unstable a position as the basket of a balloon (a sudden lurch of the basket at the instant of observation may easily cause an error of 10 or 12 mils), and partly to the difficulties of re-location.

For the rapid determination of fire corrections all railway battery commanders have used a deviation slide rule, or "slipstick" as it has usually been called, of the type devised by Lieutenant Colonel John B. Murphy, C. A. C. This device is extremely simple in construction and operation. (See Figure 11.) It consists of a slide on which are plotted the deviations and which carries a pointer moving along a fixed scale graduated in yards "plus" and "minus," or in

suitable reference numbers. In commencing an adjustment the slide is set at normal and deviations are plotted so much "plus" or "minus" with reference to the wire or string representing the location of the setforward point. The center of impact or center of mass of the plotted deviations may readily be determined by eye. In position "A" of the slide in Figure 11, let it be assumed that we have fired four trial shots (shaded plots) which fell — 25, — 100, — 125, and — 50; the slide has been moved to bring the center of this group under the wire, and the pointer has indicated the proper correction, +75. This correction has been applied and we have fired eight shots which fell as shown by the solid plots on the slide. Since these were fired a little later than the trial shots, and close together in time, we have plotted them in the same horizontal line on the slide, but a little higher up, that we may, if it seems advisable, be able to base our next correction on the most recent group fired under nearly identical conditions. This seems to be in a different grouping from the trial shots, so we shall not consider the trial shots further in our corrections. Position "B" of the slide shows the slide moved to bring the center of the group of eight under the wire, and the index points to a net correction of +160. The device may be used for graphic solution of the method of successive approximations as well. It shows instantly at any time, the correction necessary to bring the center of impact of all shots, or of any group of shots, on the target, relieving the battery commander of all necessity for pencil and paper calculations. The device is simple, easily made, rapidly operated, and practically fool-proof.

It has been customary to apply fire corrections in range as flat corrections, but last summer our range boards were modified, with the assistance of the Coast Artillery Board, by placing logarithmic scales on Chart "C" (see Figure 7), thus making this device a percentage corrector, applying corrections as percentages of the range. For discussions of percentage corrections see THE COAST ARTILLERY JOURNAL for December, 1923, Coast Artillery Board Notes, and the report of the Board on "Fire Against Naval Targets" in the August, 1923, number.

Antiaircraft Defense of a Locality

By Captain B. F. Harmon, C. A. C.

Editor's Note: *The following tactical problem prepared by the Plans and Training Officer of the 62nd Artillery and approved by Brigadier General Hugh Drum, commanding the 2nd Coast Artillery District, was drawn up to be used for the tactical instruction of National Guard and Reserve Officers who attended Camp Alexander Hamilton during the summer of 1923. This problem should prove of particular interest to Regular, Reserve and National Guard Officers assigned to antiaircraft units.*

Map: Camp Upton and vicinity, Fire Control map, 1/20,000

General Situation

RED AND BLUE forces each numbering two corps are opposing each other on a North and South line 20 miles west of Camp Upton. Red air forces have obtained the supremacy of the air for the time being in this theatre and reduced Blue air operations to a very considerable degree. In the course of Red air raids the large Blue ammunition dump at Mastic has been destroyed. Both forces have two complete bombing squadrons in operation but there is no immediate possibility of replacement as all materiel is needed in other theatres.

Red forces are preparing to obtain a decision in this theatre in the near future. The Blue line is protected by two Artillery regiments (antiaircraft). There are no other A. A. units on Long Island.

Special Situation (Blue)

The 62nd Artillery (antiaircraft) is encamped at CR 98, Camp Upton. In the central portion of the old Camp Upton site preparations are under way for the construction of a new corps dump to replace the one destroyed at Mastic. Ammunition will begin to arrive in this dump at 9:00 P. M., July 2.

At 11:00 A. M., July 1, the commanding officer, 62nd Artillery, receives the following message from the C. O. 1st A. A. Brigade:

> Take up position to defend against aerial attack the Corps ammunition dump at Camp Upton. Complete your defense prior to arrival of first ammunition train.

Requirements

1. The estimate of the situation and the decision as made by the Commanding Officer, 62nd Artillery.

2. A map showing the location of units of the 62nd Artillery, the extent of the defense afforded, and a written explanation thereof.

An Approved Solution

A. The estimate of the situation and decision as made by the Commanding Officer, 62nd Artillery.

1. MISSION.

The mission assigned the regiment is clearly defined in the order received: "Defend against aerial attack the Corps Ammunition Dump at Camp Upton."

2. ENEMY.

a. *Situation.*—The strength of the enemy air force has not been determined except insofar as the bombing units are concerned which number two squadrons. This, of course, is the important item in a defense of this nature. From the fact that he has obtained mastery of the air it is deduced that he is strong in pursuit planes and, of course, he would naturally have a complement of reconnaissance planes in proportion to the two corps composing his forces on Long Island.

His air field is not at present known nor is this of vital importance. Long Island at this point is very narrow and the exact location of the flying field does not necessarily predetermine an exact course. This will be discussed in more detail under General Factors. There are no supporting troops (referring to air service units) within his reach insofar as known.

In physical condition, training and the condition of their equipment the Red aviators are excellent. Their morale is probably particularly high due to recent victories in the air. From this it is deduced that his flights will be as audacious as his morale is high.

b. *Probable knowledge of our situation.*—Since the arrival of the regiment in camp no Red planes have flown over. Even should the regiment be noted prior to its departure that fact could have no particular significance. The enemy knows nothing of the ammunition dump as it is still in project and work has not been started thereon.

c. *General Factors.*—The dump to be protected is within easy flying distance of the enemy. The old Camp Upton site is a clearing surrounded by dense undergrowth and cross hatched with roads. Hence it is easily locatable by any hostile plane approaching from any direction. The Island is so narrow at this point a plane could see the camp site from shore to shore at usual flying altitudes. The foregoing applies to day flying and is more or less true at night. At any rate the location of Camp Upton is easily found at night by first locating Artist Lake, Grass Pond, Carmans River or other

bodies of water, or following the Long Island Railroad, through the center of the island. By any one of these landmarks he could get close enough to the site to observe it and shape his course accordingly.

The weather is generally clear with excellent visibility.

As mentioned previously, the question of supply insofar as enemy air service materiel is concerned, is acute. This is almost counterbalanced, however, by his present supremacy of the air.

d. *Lines of action open to enemy.*—A resume of the enemy's situation indicates the probability of daylight as well as night bombing raids on the utilities serving the Blue troops, particularly ammunition dumps, and the General Factors likewise favor such action except the question of supply which, as mentioned above, is partially counteracted by his present air supremacy. It has further been stated in the General Situation that he is preparing to seek a decision in the near future. Everything indicates an attack upon the Camp Upton dump except that the enemy, as stated under "Probable knowledge of our situation," has as yet no information of the new location for this corps dump.

e. *Probable Intentions.*—The general plan of the enemy, then, is deduced to be as follows: To send reconnaissance planes in an effort to locate the dump which he knows will be constructed to replace that at Mastic, and once located, to attempt its destruction by night assuredly, and probably by day as well. In accomplishing this aim, he can cross the lines, in doing which he must pass over the defense of these lines, or he can circle the lines at either extremity and finally approach from North or South.

3. OUR OWN TROOPS.

a. *Situation.*—The 62nd Artillery is organized in accordance with Table 120 W. They are equipped with the following armament (in number as specified in that table):

Machine Guns, Caliber .30 Browning A. A.
Guns, 3-inch, 2600 f.s., Mobile A. A.
Searchlights, 60-inch, open type A. A. on Cadillac units.

The entire regiment is in camp at Cross Roads 98, Camp Upton. The only other Antiaircraft units (Blue) on Long Island are the two regiments extended across the line occupied by our forces. These units will form a zone of fire extending across the island and approximately eight miles in depth.

The regiment is thoroughly equipped and prepared for field service.

Under the consideration of terrain the factors mentioned under that heading in the enemy estimate apply equally. In addition the following items are noted: The scarcity of roads militates against the occupation of ideal gun and searchlight positions to a considerable degree. The thick undergrowth and trees will be a hindrance from a standpoint of visibility and accessibility of ideal locations (from a tactical standpoint) but greatly assist the question of concealment. The old Camp Upton site is torn up with ditches and is a criss-cross of roads. These have already been registered in enemy air photographs and bearing that fact in mind these marks of the terrain could be utilized in such a way as to render the detection of the dump very difficult.

Weather and visibility same as in enemy estimate.

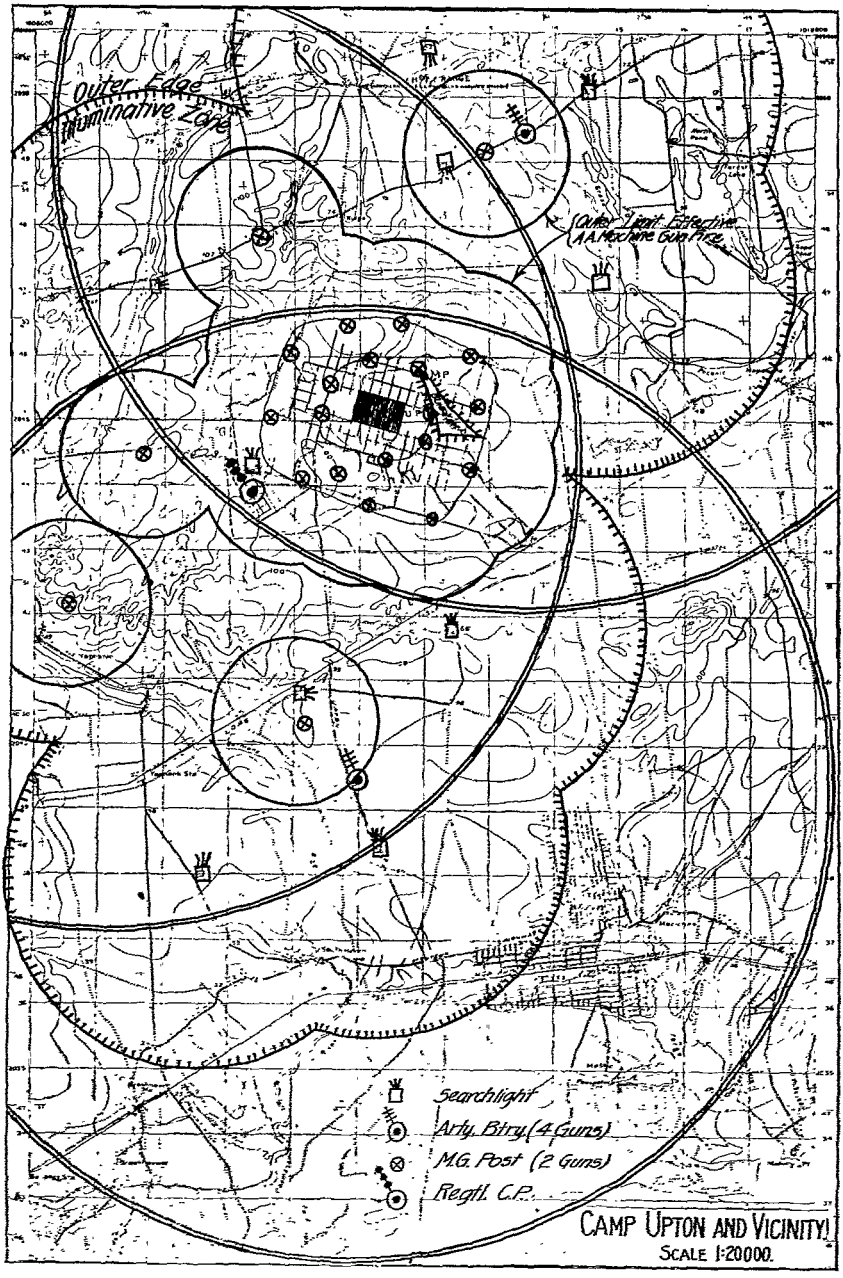
The corps supply system can meet the needs of the regiment in ammunition and other supplies.

b. *Lines of Action open to us.*—The subject matter brought out under a discussion of the terrain suggests at once the advisability of a false defense for the protection of the new dump. There are two deterrents to this, first, the probable determination of the enemy to destroy the Corps ammunition dumps and second our own situation, which shows but one regiment for the defense. Again, false defense is extended defense whereas the ease of approach to Camp Upton and its vulnerability calls for close defense.

4. DECISION.

The Regimental Commander therefore decides to establish a close direct defense of the Corps dump at Camp Upton but to have this defense function only against a bombing attack on Camp Upton in carrying out the idea of false defense.

The general plan to carry out this decision is: Circle the area by gun and searchlight defense sited in close positions. Inasmuch as there are but three gun batteries and three searchlight platoons one side must be weaker than the other three and in this case North, South and West are the more important. Surround the area by machine gun defense. Conceal all elements carefully. By arrangement with Corps Commander construct a false dump near the site of the old one in Mastic. One gun battery and searchlight platoon (South) will be in correct position for the defense of Mastic even though sited for Camp Upton. This sector will engage all hostile planes at all times. Other sectors will be forbidden to fire at any but bombing formations and then only when such formations are headed so as to pass over Camp Upton.


Outer Edge Illuminative Zone
Outer Limit Effective A.A. Machine Gun Fire
Searchlight
Arty. Bttry. (4 Guns)
M.G. Post (2 Guns)
Regtl. C.P.
CAMP UPTON AND VICINITY
SCALE 1:20000.

B. See attached defense map.

C. Written explanation of defense map.

1. GUNS.

This area, for a close defense, where there is no probable avenue of approach, could best be defended from four sites. However, there are but twelve guns, and the defense must be organized for night fire in which batteries must be at least four guns. Therefore three sites are selected to the West, North and South. Each of these will cover with their fire at maximum altitude, the safety line, so that all twelve guns can engage a target close to the defended area. The East, being the least probable direction of attack is left weakest. Bearing in mind that the 2600 f.s. guns are very heavy, good roads must be selected for positions.

As mentioned previously, the North and West batteries are given orders to fire only at bombing planes and then only when the course of such planes would take them over Camp Upton. The South battery engages all targets at all times.

2. SEARCHLIGHTS.

The general location of searchlight platoons is more or less predetermined when the gun batteries have been sited inasmuch as the platoon theoretically, should be arranged about the gun battery in a diamond or square about 2500 to 3000 yards to the side. Several factors in this case interfere with this theoretical arrangement, namely, lack of roads, prevalence of trees and the necessity of extending the illuminated zone as far as possible to the East so as not to leave this side of the defense absolutely dark. In overcoming these difficulties in two cases (South and North) the platoon has been extended slightly more than usually desirable. The resultant illuminated area extends well to the North, South and West and somewhat to the East. The small blind area near the dump is of no particular importance as the plane, at the expected altitude, has passed his bombing point before reaching it.

The same regulations for action apply to the three searchlight platoons as to the gun batteries they accompany.

3. MACHINE GUNS.

There are four machine gun batteries for the defense of this small area. Our policy is to establish machine guns in two gun (section) posts which will allow twenty-four of such posts. Due to Camp Upton's visibility to an aviator there is no proper avenue of approach. Therefore the machine guns will be sited so as to sur-

round the dump completely with a double line of continuous fire. From whatever direction the plane approaches it will be a favorable angle for four posts and thus receive the concentrated fire of at least eight guns. Six additional posts are established at favorable points at some distance from the dump. The machine gun defense is so strong and the possibility of a low flying plane discovering the dump is so great that no inhibition is placed on machine gun action.

4. COMMAND POST.

The command post is located toward the enemy and at a point from which the defense can best be overlooked.

"Wars are no longer fought by the armed forces alone. Every man, woman and child, every resource and every dollar in the entire nation must throw its weight toward victory in time of war. Industry alone cannot win a war; but it can lose a war by failing to supply the armies munitions, vital to their fighting efficiency.—*Dwight L. Davis.*

EDITORIALS

The Coast Artillery Board

EACH issue of THE COAST ARTILLERY JOURNAL contains a department of Coast Artillery Board Notes in which is described briefly new projects initiated by the Board during the preceding month and a report of all projects that were completed by the Board during the same period. By reading these notes from month to month an officer can keep himself informed concerning important projects under consideration by the Board and the trend of development of Coast Artillery methods and materiel.

Progress of the Coast Artillery Corps will be about in proportion to the interest officers and enlisted men throughout the service take in perfecting improvements in methods and devices applicable to new materiel. Today, much new materiel is becoming available and there are many unsolved problems confronting the Coast Artillery service. To all officers and enlisted men of the Coast Artillery Corps unimpeded progress stands as a challenge to their ability and initiative in meeting new problems. Throughout the service, new problems are being met and solved locally. The Coast Artillery Board desires to serve as a clearing house for all development. With this in view, the Board welcomes communications relating to development in methods and materiel. Such communications may be sent direct to the Board. Sketches and explanations may be informal. There is no red tape.

Every suggestion received by the Coast Artillery Board is considered very carefully and the author advised as to its present usefulness. Sometimes the suggestions advanced cannot be accepted in toto, but very frequently such suggestions have some particular feature which can be developed into a useful improvement. It is the business of the Coast Artillery Board to "leave the chaff, and take the wheat," so to speak, but in doing this it is the policy of the Board to recommend personal credit to the officer or enlisted man concerned.

Officers and enlisted men will contribute materially to the progress of the Coast Artillery service by communicating freely with the Coast Artillery Board so that various ideas for improvements may be given careful consideration and the results published for the information of the service. These being the facts in the case, using a scriptural allusion, "Why hide your light under a bushel?"

It Will Never Happen Again

The pacifist is ever looking forward to the fulfillment of the vision of Lord Tennyson:

Till the war-drum throbbed no longer, and the battle flags are furled
In the Parliament of man, the Federation of the world.

The pacifist nurtures high ideals; he from time to time sends forth the dove to fetch the olive branch of peace. Instead of carefully examining the sole of her foot when she returns, he fondly imagines she bears the olive branch in her bill. He keeps clearly in mind his mission, but is careless as to the historical setting and the analysis of present conditions. The waters subside slowly, but the dreamer takes little note of hydrostatic conditions.

The "Parliament of man, the Federation of the world" is a wonderful dream; at present it appears to be but an iridescent dream—nothing more. If this dream ever comes true it will not be by a mere dreamer of dreams, but by practical idealism.

In the early part of 1914 an eminent American educator, one of our most prominent peace advocates, visited Europe. This gentleman was president of one of our largest universities; he could write after his name abbreviations which indicated that he held numerous degrees; he fulfilled in an eminent degree all that is implied in the phrase "gentleman and scholar." Seeing, he saw not; hearing, he heard not; to him the world was in perfect tune; life was one glad, grand song. He returned to the United States and announced that for civilized nations to go to war was unspeakable, impossible. Yet, under his very feet during this pilgrimage in the year of our Lord, 1914, the fires of hell and hate were banked. Instead of studying human nature in its raw state he was revolving in his mind his cherished ideals; formulating polished phrases to show that the world was a safe and beautiful place to live in. Such was the conclusion of the scholar and doctrinaire in world politics.

Who has the hardihood to say that the learned doctor was not right in his conclusions. Is it not impossible, unspeakable for civilized nations to make war on each other? In its final assessment, however, human nature is self-destructive.

Of course it will never happen again; it never does till the next time.—*The Cactus*, publication of the 103d Division.

The Prize Essay Competition

On the inside back cover of this issue of THE JOURNAL appear the conditions under which the Annual Prize Essay is conducted. This competition is almost traditional with THE JOURNAL, having been instituted fourteen years ago. It is believed there are many who fail to enter this competition because of the belief that they are not qualified due to lack of experience or literary style. In answer to the first, it can be said that the prizes have been carried off in the majority of cases by officers of very limited service. With regard to the second, the judges are primarily concerned with the subject matter of the essay rather than its composition. The world is full of people who understand perfectly all the rules of grammar and composition but who unfortunately are not possessed of initiative, confidence, capacity for work, or ability to reason logically. While these qualities are more or less essential to success in any walk of life, they are absolutely so in the military profession. The Annual Competition offers an opportunity whereby an officer may not only improve himself in regard to these qualities but at the same time render a distinct service to his Corps. Moreover, whether or not the author is successful in winning one of the two prizes, he cannot fail to improve himself as an artilleryman by having given concentrated thought to the subject selected.

The competition is not limited to JOURNAL subscribers, but is open to civilians or officers, regardless of branch of service, or whether of the Regular Army, National Guard or Organized Reserves. The author is privileged to write on any subject provided only that it relates to some phase of policy, tactics or technique involved in the mission of the Coast Artillery. It would be difficult to write an article relating to a Coast Artillery subject that does not come under this broad category. With all the new and important problems confronting the Coast Artilleryman in his daily work, the selection of a subject should not be difficult.

The following list is published with the hope that the reader may find therein the suggestion for a subject upon which to write:

Aviation; Its Present Status in Coast Defense and Influence on the Role of the Coast Artillery

Cooperation Between the Air Service and the Coast Artillery

The Necessity of Mobile Artillery for Seacoast Defense

The Mission of the Coast Artillery in the Positive System of Coast Defense

Coast Artillery Gunnery of Today and the Problems of Long Range and Indirect Fire

The Tactical Employment of an Antiaircraft Regiment When Operating With an Army Corps

The Best Means of Combating and Using Smoke in Seacoast Defense

The Use of Mines in Harbor Defense

The Coast Artillery Spirit; Its Place in Our National Defense

Best Methods of Regimental Training and Instruction

The Missions of the Coast Artillery in Time of War

The Future of Our Coast Artillery

What Should Be the Strength of the Coast Artillery in Time of Peace and War

The Value of and Best Methods of Fire Adjustment Against Moving Targets

Principles Governing the Use of Antiaircraft Artillery in the Defense of Our Coast

The Tactical Employment of a 155-mm. G. P. F. Regiment as Corps Artillery

The Future Development of Antiaircraft Artillery

The Navy and Its Relation to Coast Defense

National Guard Spirit and the Best Means of Maintaining Efficient Coast Artillery National Guard Regiments

The Value of and Best Means of Conducting Coast Artillery Summer Training Camps

Cooperation Between Coast Artillery Regulars, National Guard and Organized Reserve in Time of Peace

The Mission of the Coast Artillery Organized Reserve in Time of War, Including Its Mobilization and Assignment to Station

The Best Educational Policy for Coast Artillery Officers of the Regular Service

Recreation and Training of Coast Artillery Troops During the Indoor Season

The History of the Coast Artillery Corps

Tactical Employment of Railway Artillery when Operating With an Army in the Field

On the Assumption that the Enemy Controls the Sea, What Would Constitute Suitable Coast Artillery Armament and Personnel

for the Defense of New York; San Francisco; Boston; Charleston; Panama Canal; Hawaii

Best Method of Training a Coast Artillery Battery for Target Practice

Coast Defense Lessons to Be Obtained from a Study of the Dardanelles Campaign

Fire Control by Battery and Higher Commanders

The Use of the 155-mm. G. P. F. Gun for Coast Defense

Strategic Importance of the Panama Canal and the Role of Coast Artillery in Its Defense

Present Day Development and Use of Trench Mortars

Airplane Adjustment of Artillery Fire

The Relative Value and Best Methods for Using Range Finding Instruments

The Tactical Chain of Command in the Positive System of Coast Defense, with Special Relation to the Coast Artillery Corps

Harbor Defenses of the Future

The Antiaircraft Regiment; a Discussion of an Ideal Organization and Ideal Armament, Including Guns, Ammunition and Fire Control Equipment

How to Secure Best Results at Target Practice

The Best Type of Projectile for Tractor-Drawn Artillery

A War Condition Period and How It Can Best Be Utilized

The Tactics of Harbor Defense

Coast Artillery Target Practice; Its Purpose and How Best to Accomplish it

A Discussion of the Probable Assignment of Regular, National Guard and Reserve Coast Artillery Regiments Upon the Outbreak of War

The Best Means of Combating Enemy Aircraft Against Coast Fortifications

The Tactical Handling of Railway Artillery in Coast Defense

Best Types of Future Harbor Fortifications

Organization of a Harbor Defense for War

Target Practice Methods

COAST ARTILLERY BOARD NOTES

Communications relating to the development or improvement in methods or materiel for the Coast Artillery will be welcome from any member of the Corps or of the service at large. These communications, with models or drawings of devices proposed may be sent direct to the Coast Artillery Board, Fort Monroe, Virginia, and will receive careful consideration.—R. S. ABERNETHY, *Col., C. A. C., President Coast Artillery Board.*

New Projects Initiated During the Month of August

Project No. 258, Tactical Employment of Antiaircraft Artillery.—The Coast Artillery Board has long considered it advisable that recommendations be made to the Chief of Coast Artillery for the modification of Training Regulations No. 435-30, to the end that the maximum defense shall be afforded by the Coast Artillery units responsible for antiaircraft defense. The Board therefore initiated this project and will recommend certain changes and modifications in the above mentioned Training Regulations.

Project No. 259, Comments on T. R. 435-330, Tactical Use of Searchlights in Coast Defense.—The proposed Training Regulations were studied by the Board and certain changes recommended.

Project No. 260, Percentage Range Correction Charts.—The issue of Percentage Range Correction Charts having been approved, the construction of these charts is now being undertaken.

Project No. 261, Drift and Cross Wind Charts For Long Range Deflection Board, Model 1923E.—In connection with the deflection board, Model 1923, which has been received by the Board, various types of charts to include corrections for drift and cross winds are being investigated.

Project No. 262, Drift and Cross Wind Charts For Mortar Deflection Board, Model 1905.—In order to be able to make ballistic deflection corrections on the present mortar deflection board various types of charts are being investigated to take the place of the old DeCarré Drift Chart.

Project No. 263, Test of Type EE-8 Telephones, Model 1924.—In August, 1924, the Coast Artillery Board received from the Signal Corps for test a Field Telephone, Type EE-8, Model 1924. This telephone has been constructed to embody the recommendations of the various service boards after testing the model submitted by the Signal Corps in May, 1923. The Board is of the opinion that the Type EE-8 Telephone, Model 1924, including the receivers and transmitters, is in general, satisfactory for use by Coast Artillery where field telephones are to be utilized. The report of the Board will be published later.

Project No. 264, The Antiaircraft Artillery Meteorological Message.—Provisions have been made for a meteorological message for antiaircraft artillery (message beginning with the number 2.) However, no instructions concerning the preparation of the antiaircraft meteorological message have been issued. The Board is of the opinion that a single meteorological message for terrestrial

artillery, and a separate message for antiaircraft artillery is not desirable. Three messages to apply equally well to all artillery, depending upon the conditions of firing, and corresponding to a classification to be given in firing tables, are believed to be more satisfactory. The report of the Board on the project will be published later.

Project No. 265, Uniforms, Enlisted Men.—Data has been submitted for study by the Board as to provisions which should be made in the estimates for the fiscal year, 1926, to improve the enlisted men's uniform.

Project No. 266, Axes, hand, intrenching and carrier—Issue of to Coast Artillery Troops.—A Coast Defense commander recommended that there be added to the equipment authorized by Circular No. 58, War Department, 1923, to be issued to Coast Artillery troops assigned to fixed defenses, axes, hand, intrenching, Model 1910 and carriers for hand axe, intrenching, Model 1910, in the amounts of one (1) per squad and one (1) per hand axe respectively. This recommendation was referred to the Board for remark and recommendation. It was the opinion of the Board that the Coast Artillery soldier assigned to fixed defenses would not require the addition of intrenching tools to be worn on the person in war and that his training and inspections should not normally require their use in time of peace. The Board therefore recommended that the items be not added to the equipment to be issued to the Coast Artillery soldier assigned to fixed defenses.

Project No. 267, Comments on T. R. 435-26, Tactical Employment of Tractor Artillery.—The proposed Training Regulations were studied by the Board and certain changes recommended.

Project No. 268, Comments on T. R. 435-185, Battery Command, Tractor Artillery (Seacoast).—The proposed Training Regulations are being studied by the Board.

Project No. 269, Range Elevation Tables and Range Relation Tables For Coast Defenses of Manila and Subic Bays.—Tables are being constructed.

Project No. 270, Tables of Allowances, 55th Artillery; Changes and Modifications of Existing Equipment.—The proceedings of a Board of Officers convened at Fort Ruger, Hawaii, June 27, 1924, to consider and make recommendations for such changes in Tables of Allowances or modifications in existing equipment of the 55th Artillery, as may be thought necessary, based on the experiences of target practice of the year 1924, was referred to the Board for study and comment.

Project No. 271, Fire Control Apparatus For Maine National Guard.—The Commanding Officer, Maine National Guard, requested certain charts and devices described in Coast Artillery Board Projects Numbers 75 and 116 be furnished.

Project No. 272, Fire Control Apparatus For Batteries at Fort Monroe.—The Commanding Officer, Coast Defenses of Chesapeake Bay, requested certain charts and devices described in Coast Artillery Board Projects Numbers 75 and 116 be furnished.

Project No. 273, Fire Control Apparatus For N. C., S. C., and Florida National Guard.—The Commanding Officers, N. C., S. C., and Florida National Guard requested certain charts and devices described in Coast Artillery Board Projects Numbers 75 and 116 be furnished.

Project No. 274, Comments on T. R. 435-25, Tactical Employment of Railway Artillery.—The proposed Training Regulations are being studied by the Board.

Project No. 275, Comparative Test of Monocord Switchboards, 4-Line Type BD-9 and EE-2A.—The switchboards have been received and are under test.

Project No. 276, Estimation of Ballistic Wind Velocity Aloft.—On account of haze and clouds it is difficult frequently to follow the pilot balloon used for measuring wind velocity aloft, to sufficiently great altitude. The Board has requested that the Signal Corps make a study of methods of estimating wind velocities aloft in order that instructions for such estimations may be compiled.

Project No. 277, Illuminating System For Mobile Seacoast Artillery Units.—The Coast Artillery Board believes that a satisfactory lighting system for night firing should be provided for all mobile coast artillery units, and is investigating this matter.

Project No. 278, Fire Control Communication Systems For Fixed Defenses.—A conference was held between officers of the Office of the Chief of Coast Artillery, the Chief Signal Officer, and members of the Coast Artillery Board, at which certain policies of installation, etc., of Fire Control Systems for Fixed Defenses were formulated. These policies have been referred to the Board for detailed study and comment.

Project No. 279, Bleeding of 155-mm. G. P. F. Gun Recoil Cylinders During Rapid Fire.—On account of the method of construction of the recoil mechanism of the 155-mm. G. P. F. gun, trouble has been reported in maintaining a high rate of fire for any length of time. The Board is making a study of the problem.

Project No. 280, Comments on T. R. 435-307, Coast Artillery Definitions.—The proposed Training Regulations were studied by the Board and certain changes recommended.

Completed Projects

Project No. 131, Panoramic Sight For Mobile Artillery.—This project originated with the Coast Artillery Board. In the study of fire control materiel and methods necessary to adapt mobile seacoast artillery to fire on naval targets it was found that the panoramic sights with which these units are equipped were unsuitable for Coast Artillery usage. The following is a study of the measures necessary to remedy this condition.

I.—*Railway Artillery Sights:* 1. With the exception of the Model 1922E panoramic sight for the new 14-inch rifles (railway), the standard panoramic sight for railway artillery is constructed so that the limb, which is graduated counter-clockwise, moves with the telescope past a fixed index. The readings on the azimuth circle increase as the line of sight is turned clockwise. The sight was designed chiefly to meet land warfare requirements. Modification of the sight is desirable for fire on naval targets.

2. *a.* In Case III fire, at naval targets, the following procedure should be practicable:

(1) To determine corrected setforward azimuths by the range detail.

(2) To set these azimuths successively on the azimuth circle of the sight.

(3) To lay the piece on these azimuths by traversing the piece, after each setting of the sight, until the vertical wire of the sight bisects the aiming point.

b. Unless such procedure be made practicable, conversion to deflection angles, as this term is used by Field Artillery, must be effected on the plotting board, or elsewhere. This complicates further the determination of firing data.

c. The procedure necessitates modification of the sight. The direction of the graduations on the azimuth circle must be clockwise instead of counter-clockwise. It must be possible also to slip the azimuth circle and adjust the micrometer scale and azimuth circle index without turning the line of sight. Such modifications have been made and tested satisfactorily at target practices by railway artillery units at Fort Eustis. A complete description of the modification is printed in THE COAST ARTILLERY JOURNAL, June, 1923, in an article by First Lieutenant Fred W. Gerhard, C. A. C., entitled "A Universal Panoramic Sight."

d. Sights modified as in subparagraph *c*, may be used in land warfare. The modification simplifies the process of laying the piece in azimuth for map firing. When deflection angles have been computed in accordance with Field Artillery methods, the sight setting to be used may be taken as 360 degrees or 6400 mils minus the computed deflection.

3. The azimuth circle on the carriage of the present railway mounts was intended originally to provide a means for firing this armament by Case III without using the panoramic sight and aiming point or aiming rule. Accuracy in azimuth laying when firing by Case III from firing tracks is difficult to obtain by use of the azimuth circle affixed to the carriage, because the entire mount must be levelled at the beginning of operations and kept level during firing. Since this cannot be done readily it is necessary to make corrections in azimuth for the effect of cant. The panoramic sight, which can be levelled and relevelled easily offers a means for avoiding the errors in direction introduced by using an azimuth circle when railway cannon are firing from a railway grade. When this class of artillery occupies prepared positions, the use of the azimuth circle on the mount is preferred to the use of the panoramic sight and aiming point for Case III fire. For general use from firing tracks, the conditions mentioned above have caused railway artillery officers to adopt the practice of laying railway artillery cannon in direction by use of the panoramic sight and aiming point or aiming rule.

4. The design of the model 1922E panoramic sight has all the features described in paragraph 2 *c* above. Sights of this design have been manufactured for the four 14-inch rifles (railway). None of these sights have been tested by the Coast Artillery Board. From correspondence between the Coast Artillery Board and Frankford Arsenal there is no doubt that the procedure outlined in paragraph 2 above, can be accomplished on the sight in a thoroughly satisfactory manner.

5. The Coast Artillery Board understands that it is the intention to equip each railway artillery cannon with two panoramic sights; one graduated in degrees and hundredths, the other in mils. In view of the adoption of the Cloke Plotting and Relocating Board as standard for railway artillery the provision of two panoramic sights appears unnecessary. The Cloke boards now being made will permit determination of firing azimuths in the same units as are on the sight. It is expected that the experimental deflection board now nearing completion at Frankford Arsenal will have similar flexibility to the Cloke Board in the determination of firing azimuths in either degrees and hundredths, or mils; and further, that this deflection board may be used either with sights of the present standard or with those constructed as in paragraphs 2 and 4 above. This later feature of the deflection board does not alter the Coast Artillery Board's conviction that

sights having the characteristics noted in paragraphs 2 and 4 above should be obtained for mobile seacoast artillery. When self-contained range finders are being used by mobile artillery there should be no great difficulty in obtaining firing azimuths in terms of the units graduated on the sights. It is believed, therefore, that only one panoramic sight should be supplied to each piece of railway artillery, and, because of the general use of degrees in measuring angles by all North American railroads, that the azimuth circle graduations of all new panoramic sights for railway artillery should be in degrees also.

6. For Case II fire by the rifles of railway artillery, the 3-inch telescopic sight, model of 1910, or a suitable substitute therefor, should be provided, and provision should be made for adapting the telescope to the present sight mountings. At the ranges which must be considered a power of 4 or 6 appears to be too small. A panoramic sight of greater magnification either would be unwieldy or would transmit insufficient light to the eye, except under excellent conditions of illumination. The present panoramic sight for railway mounts is of double magnification, 4 and 10 power. Invariably, men using the sight prefer the 4 power eyepiece to the 10. The advantages of a wide field of view at short range, and of a wide exit (pupil) at all ranges under average light conditions are very apparent in field usage of the sight. The unsuitability of the panoramic sight for direct fire at naval targets is inherent in the design. The periscope never can be made as efficient as the telescope for direct fire. The panoramic sight cannot be developed into as efficient an instrument for Case II firing as the 3-inch telescopic sight model 1910, which is the standard direct fire telescope for the Coast Artillery. It should be noted that arrangements have been provided in the sight mountings of the 14-inch railway guns for both the 3-inch telescopic sight model 1910, for direct fire, and the panoramic sight model 1922E, for indirect fire.

II.—*Tractor Railway Sights:* 7. A primary mission of tractor drawn seacoast artillery is the destruction of naval targets. The mobility of these weapons is such that, in general, positions may be had from which direct fire may be practicable. For fire on naval targets the advantages in favor of direct fire as compared with Case III are obvious and tractor artillery should be emplaced whenever practicable for direct fire. Protection for the battery should be sought through camouflage and earthworks. While Case III fire must be provided for, it is believed the chief consideration in the selection of sights for these units is suitability for both direct and indirect fire.

8. The panoramic sights now in use by tractor artillery are not suitable for direct fire. Some officers even have expressed the opinion that the use of the present panoramic sight for target practice using Case II at ranges extending to 10,000 yards and beyond is a dangerous procedure due to the inability of the gun pointer to identify positively objects at those ranges except under excellent conditions of illumination. In general the remarks in Paragraph 6 above, apply to tractor artillery sights as well as to those for railway artillery. It is extremely doubtful if we ever can develop a panoramic sight suitable for direct fire by tractor artillery on naval targets.

9. When Case III fire is to be used the present tractor artillery panoramic sight is unsuitable for the same reasons as are given in Paragraph 1 and 2 above for railway artillery sights. In addition, the length of the vertical axis is too short, i.e., the head of the gunner interferes at times with his view of an aiming point to the rear of the battery.

10. Because tractor artillery should be able to employ direct fire and because a panoramic sight suitable for direct fire cannot be had, a redesign of sight mounting

is necessary which will provide for the use of a direct fire telescope. In the design of this sight mounting provision for Case I as well as Case II and Case III should be made. A modified panoramic sight should be used for indirect fire.

11. *a.* Concerning the development of a direct fire sighting device, both Case I and Case II should be considered if this artillery is to be developed to the maximum of its capabilities as a seacoast weapon. Tractor artillery pieces now are laid in elevation by setting off the quadrant angle of elevation and then elevating the piece until the quadrant bubble is level or nearly so. With the 155-mm. gun this operation requires ten seconds on an average and imposes a considerable limitation on the attainable rate of fire.

b. If Case I fire be made practicable, the process of laying the piece in elevation would be to set the range, range-range relation, or the corresponding elevation on a range drum or elevation arc and then to depress or elevate the piece until the horizontal wire of the reticule of a direct fire telescope waterlines the target. The rate of fire would be much greater than is practicable now and the fire control problem would be simplified. Correct direction of fire would be obtained by bisecting the target with the vertical cross wire of the telescope, corrections for wind and drift having been set upon a suitable deflection scale. It is noted that the elevating and traversing mechanisms are on the left side of the piece as now designed. The handwheels are grouped conveniently for Case I fire, however. The gun pointer would be required in Case I to give both elevation and direction to the piece. This should not be difficult when the gun pointer is well trained, because the apparent motion of the target across his field of view will be slow, and usually at a fairly constant rate of change. The sightsetter, who should receive a corrected range or elevation every ten seconds, should "creep" in setting it so that the last setting received would be set on the time for which it was predicted or interpolated.

c. In analyzing this procedure, it should be noted that an error made in waterlining with the gun sight would not introduce range errors comparable to those which may be introduced into position finding in waterlining with a D. P. F.

12. In general, the sighting devices for tractor artillery should include:

a. (1) A sight bracket on which a direct fire telescopic sight such as the 1904, 1910, or 1912 models, or some other suitable design, may be mounted.

(2) A range drum or elevation arc (or both) to indicate either sight or quadrant elevation.

(3) A bubble tube of suitable arc attached to the telescope mounting so that it may be levelled by elevating or depressing the piece, with an adjustment such that the bubble may be levelled when the axis of the bore has been shown to be level by a clinometer in the muzzle or by other means.

b. A modified panoramic sight, or a panoramic sight of suitable design, mounted so that it may be used for indirect fire.

III.—*Recommendations:* 13. The Board recommended:

a. That all panoramic sights (except the model 1922E) issued to mobile seacoast artillery be modified by the Ordnance Department in general conformity with the modifications described in paragraph 2.

b. That no more panoramic sights of the present standards (except Model 1922E) be manufactured for Coast Artillery use.

c. That the design of the Model 1922E panoramic sight be adopted as the standard design for railway artillery in future manufacture.

d. That the sight mountings of all non-obsolete railway rifles be modified to permit the use of a standard direct fire telescope and that a standard direct fire

telescope be allotted and furnished eventually for each modified sight mounting.

e. That the present policy which allots two sets of equipment, one graduated in mils and one in degrees, to railway artillery, be re-examined and that only one panoramic sight per piece with provision for one spare per battery, be allotted to these weapons. Concerning this recommendation, it is the opinion of the Board that insofar as existing stocks will permit, sights graduated in degrees should be furnished to railway artillery.

f. That the Ordnance Department undertake, at an early date, the development of a sight mounting suitable for tractor drawn seacoast artillery, and that provision be made in the design of this sight mounting for the employment of Case I, Case II and Case III fire, in general accordance with the provisions of paragraph 10, 11 and 12, above.

g. That the Ordnance Department undertake the design of a panoramic sight suitable for the employment of Case III fire by tractor drawn seacoast artillery against naval targets. A sight smaller than the Model 1922E sight for railway artillery, but of the same general design, would be satisfactory. Since this sight will be a piece of equipment especially designed for Coast Artillery use, the Board is of the opinion that it is preferable to graduate the sight in degrees and hundredths, thereby making for uniformity of units in the Coast Artillery service. However, no specific recommendation for such graduation is made, as the paramount consideration is a sight with mechanical provisions, including clockwise graduations, similar to the Model 1922E sight. If practicable, a magnification greater than 4 power is desired, with an exit pupil of about two-tenths of one inch. The length of the vertical axis should be increased over that of the Model 1915 and Model 1917 panoramic sights. The latter provision should eliminate interference by the gun pointer's head with the view of an aiming point in rear of a battery.

IV.—*Action by Chief of Coast Artillery:* 14. The following action by the Office of the Chief of Coast Artillery as contained in 1st Indorsement (473.85/R), March 28, 1924, to the Chief of Ordnance, is quoted:

"1. Herewith is report of the Coast Artillery Board on Panoramic Sights for Mobile Artillery (Coast Artillery Board Project No. 131). In reference to the recommendations contained in subparagraph (a), paragraph 13, under III Recommendations, it is requested that a study be made to determine the feasibility of modifying panoramic sights which are graduated in degrees and now issued to railway artillery organizations and that the estimated cost of such modification be determined.

"2. In reference to the recommendations contained in subparagraph (b), paragraph 17, under III Recommendations, it is understood that it has been the policy of the Ordnance Department for some time not to manufacture any more panoramic sights, Model 1917 or Model 1915, for Coast Artillery use.

"3. It is not believed desirable to adopt the panoramic sight, Model 1922E, as the standard for railway artillery until it has had a service test to determine whether or not any modifications are required. In reference to the recommendations contained in subparagraph (d), paragraph 17, under III Recommendations, it is requested that the estimated cost of providing sight mountings for direct fire telescopes for 8-inch railway guns be determined. Information is also desired as to whether or not suitable direct fire telescopic sights are on hand.

"4. The recommendations of the Coast Artillery Board contained in subparagraphs (f) and (g), paragraph 17, under III Recommendations, are concurred in."

BULLETIN BOARD

The Coast Artillery Rifle and Pistol Teams

EDITOR'S NOTE: THE JOURNAL *is indebted to Captain H. C. Barnes, Jr., for the following information reference the above teams. In view of the fact that the National Matches at Camp Perry did not commence until September 15, it was not possible to include in this issue of* THE JOURNAL *the outcome of these matches. A report of these matches will be published in the November* JOURNAL.

On June 25th, the Coast Artillery Rifle and Pistol Squad assembled at the Bay State Rifle Range, Wakefield, Massachusetts, for elimination and team training.

The composition of the squad was as follows:

Major Clair W. Baird (Team Capt.)	Fort Adams, R. I.
Lt. H. C. Barnes, Jr. (Team Coach)	Fort Monroe, Va.
Major William S. Fulton	Fort Banks, Mass.
Captain Joseph W. Barker	Fort Banks, Mass.
Captain William G. Brey	Fort MacArthur, Calif.
Captain James D. Brown	Fort Worden, Wash.
Captain John T. Lewis	Fort Monroe, Va.
Captain Charles E. Loucks	Fort Eustis, Va.
Captain Everard F. Olsen	Fort Monroe, Va.
Captain Caesar R. Roberts	Fort Winfield Scott, Calif.
Captain William H. Sweet	Fort Monroe, Va.
Captain Francis F. Swett	Fort Kamehameha, Hawaii
1st Lieut. Clarence E. Brand	Fort Amador, C. Z.
1st Lieut. Robert W. Crichlow, Jr.	Fort Shafter, Hawaii
1st Lieut. Joseph B. Hafer	Fort Kamehameha, Hawaii
1st Lieut. Edgar W. King	Fort Amador, C. Z.
1st Lieut. Riley E. McGarraugh	Fort Banks, Mass.
1st Lieut. George F. Nichols	Fort Adams, R. I.
1st Lieut. Gervais W. Trichel	Fort Amador, C. Z.
1st Lieut. John A. Weeks	Fort Winfield Scott, Calif.
1st Lieut. Leon A. White	Fort Amador, C. Z.
1st Lieut. Charles F. Wilson	Fort Winfield Scott, Calif.
2d Lieut. Lawrence S. Barrell	Fort Monroe, Va.
2d Lieut. Milo G. Cary	Fort Sherman, C. Z.
2d Lieut. John E. Reierson	Fort Preble, Me.
2d Lieut. Gustave H. Vogel	Fort Shafter, Hawaii
Sergeant Ernest F. Bonnette	Fort Eustis, Va.
Sergeant Henry R. Bramlett	Fort Barrancas, Fla.
Sergeant James S. Chesser	Fort Hancock, N. J.
Sergeant John B. Grigsby	Fort Shafter, Hawaii
Sergeant Fay S. Hammers	Fort Monroe, Va.

Sergeant John R. Lastovska	Fort Monroe, Va.
Sergeant Peter Oblotski	Fort Monroe, Va.
Sergeant George B. Ping	Fort Shafter, Hawaii
Sergeant Henry E. Warren	Fort Worden, Wash.
Sergeant James Wertzberger	Fort H. G. Wright, N. Y.
Sergeant Patrick J. White	Fort Totten, N. Y.
Corporal James E. Hanlon	Fort Banks, Mass.
Corporal John W. Simpson	Fort Winfield Scott, Calif.
Corporal Richie B. Warren	Fort Monroe, Va.
Private John M. McAlhaney	Fort Barrancas, Fla.
Private August J. Spletter	Fort Eustis, Va.

About the end of July the squad was reduced so as to include only those members who were to constitute the Camp Perry squad, the successful candidates being the following:

Major Clair W. Baird, team captain; Major William S. Fulton, Captain Francis F. Swett, Captain Charles E. Loucks, Captain Everard F. Olsen, Captain William H. Sweet, Captain James D. Brown, 1st Lieut. Harry C. Barnes, Jr., team coach; 1st Lieut. George F. Nichols, 1st Lieut. Leon A. White, 1st Lieut. Charles F. Wilson, 1st Lieut. Robert W. Crichlow, Jr., 2d Lieut. Lawrence S. Barroll Sergeant James Wertzberger, Sergeant Henry E. Warren, Sergeant John B. Grigsby, Sergeant George B. Ping, Sergeant Patrick J. White, Corporal John W. Simpson, Private John M. McAlhaney, 1st Lieut. Gervais W. Trichel, team adjutant; Captain Joseph W. Barker, range detail; Captain Caesar R. Roberts, range detail; 1st Lieut. Edgar W. King, range detail; Private Silas W. Lynch, range detail; Technical Sergeant Arthur W. Holt, Sergeant Major; Corporal James E. Hanlon, Supply Sergeant; Sergeant Alvin C. Curtis, Mess Sergeant; Private 1st Class Clifton Manuel, Cook.

From July 29th to August 15th, there ensued a period of team training during which time every effort was made to train and develop the team, both as individuals and as a team, for entry into the matches at Camp Perry.

At the completion of the shooting at Wakefield the team lined up in order of merit as shown below:

First—1st Lieut. Leon A. White, 1st Lieut. Harry C. Barnes, Jr.
Third—Sergeant James Wertzberger.
Fourth—Captain James D. Brown.
Fifth—Private John M. McAlhaney.
Sixth—1st Lieut. Robert W. Crichlow, Jr.
Seventh—Captain Francis F. Swett.
Eighth—1st Lieut. George F. Nichols.
Ninth—Sergeant Patrick J. White.
Tenth—Sergeant George B. Ping.
Eleventh—Captain Charles E. Loucks.
Twelfth—Captain Everard F. Olsen.
Thirteenth—Major Clair W. Baird.
Fourteenth—Sergeant Henry E. Warren.
Fifteenth—1st Lieut. Charles F. Wilson.
Sixteenth—Sergeant John B. Grigsby.
Seventeenth—Major William S. Fulton.
Eighteenth—2d Lieut. Lawrence S. Barroll.
Nineteenth—Corporal John W. Simpson.
Twentieth—Captain William H. Sweet.

During the New England Matches, which were held at Wakefield from August 16th to 23d, the members of our squad were entered in practically all events. Some of the results are shown below:

Ratigan Match, 10 shots 200 yards slow fire, standing—Second place, Captain James D. Brown; score 48.

Neidner Match, 10 shots 200 yards rapid fire, Target A—Third place, Sergeant James Wertzberger; score 50.

Estabrook Match, 10 shots 300 yards slow fire, sitting—First place, Corporal John W. Simpson; score 50 plus 3.

Marine Corps 2-Man Team Match, 600 and 1000 yards—Third place, Major Clair W. Baird, score 94; Captain Everard F. Olsen, score 91; total, 185.

Essex County Match, 10 shots 200 yards, rapid fire, Target A—First place, 1st Lieut. George F. Nichols; score 49.

The squad left Wakefield September 1st and arrived at Camp Perry September 2d, where it is now preparing for the National Matches, which begin September 15th.

Review of Coast Artillery Troops in Hawaii

Two general reviews have recently been held in the Hawaiian Department. The first review was held at Schofield Barracks, where the Hawaiian Division is stationed, the second at Fort Shafter, Honolulu, with the troops from the Hawaiian Coast Artillery District taking part.

The reviews were held to present with appropriate ceremony and honors the various awards and cups that have been won by organizations of the Department during the past year. At Schofield Barracks the Division paraded and awards were made as follows: To Company L, 35th Infantry, cup and pennant for winning the company drill in the Hawaiian Department precision drill competition; to a squad from Company E, 19th Infantry, cup for winning the squad drill in the Department precision drill competition; to a squad from the 13th Field Artillery, an award for winning the interior guard competition of the Hawaiian Division; to mess sergeant and cooks of Company A, 21st Infantry, prize for winning the Division mess competition; and to Private Loren Smith, prize for attaining the second highest number of points in the Department bugler contest.

Awards for the Hawaiian Coast Artillery District consisted of: Department Commander's cup for best all-around firing of Coast Artillery organizations, which went to Battery D, 55th Coast Artillery, commanded by Lieut. George Badger; to Battery A, 16th Coast Artillery, prize for winning the fixed gun competition; to Battery C, 16th Coast Artillery, award for best firing of mortars; to first platoon, Battery B, 41st Coast Artillery, prize for winning platoon drill in Department precision drill competition; and to Private R. M. Lurbe, Battery H, 55th Coast Artillery, prize won as best bugler in the Hawaiian Department.

At both ceremonies the organizations receiving awards formed to the right and left in rear of the reviewing party and reviewed the troops. At the end of the review of the Hawaiian Division, the troops were massed and General Summerall took the occasion to make a farewell speech to the garrison and expressed his appreciation of the highly efficient manner in which the work of the Department had been carried out since he had been in command. The troops of the Hawaiian Coast Artillery District were also massed after the review at Fort Shafter and General Summerall made a similar speech to the officers and men of the Coast Artillery forces, expressing himself as highly pleased with the splendid progress of the Coast Artillery organizations in the Hawaiian Department.

The Use of Artillery During the Revolutionary War

EDITOR'S NOTE: *The following extracts are from "A Treatise of Artillery," By John Muller, published at Philadelphia, 1779. This book is one of the 47,000 volumes constituting the Library of the Coast Artillery School.*

In the spring, so soon as the weather permits, the exercise of the great guns begins, with an intention to show the gentlemen cadets and private men the manner of laying, loading, and firing the guns, at various distances from the but mark; and as the line of direction is not marked upon the guns, they have a small instrument called a perpendicular, to find the center line or two points, one at the breech, and the other at the muzzle, which are marked with chalk, and whereby the piece is directed to the target; this being done, a quadrant is introduced into the mouth, in order to give it a proper elevation, which at first is guessed at, according to the distance the target is from the piece. When the piece has been fired, it is sponged, to clear it from any dust or sparks of fire that might remain in it, and loaded, then the center line is found, as before; and if the shot went too high or too low, the elevation is altered accordingly. This way of firing continues morning and evening for a month or six weeks more or less, according if there are a greater or less number of recruits. In the meantime, others are shown the motion of quick firing with field pieces.

After the gun exercise is over, that of mortar begins, and sometimes they are carried on both together; the usual manner is thus: a line of 12 or 1500 yards is traced in an open spot of ground, from the place where the mortars stand, and a flag fived at the end; this being done, the ground where the mortars are to be placed is prepared and levelled with some sand, so as they may stand at an elevation of 45 degrees; then they are loaded with a small quantity of powder at first, but increased afterwards, by an ounce every time, till it is loaded with a full charge: the times of the flights of the shells are observed, to determine the length of the fuses.

The intention of this practice is, when a mortar battery is raised in a siege, to know what quantity of powder is required to throw the shells into the works at a given distance, and to cut the fuses of a just length, that the shell may burst as soon as it touches the ground. This is certainly a very good method, with regard to its intention; but in a siege shells are not or never should be thrown with an angle of 45 degrees, but in one single case only, which scarcely ever happens, that is, when the battery is so far off that they cannot otherwise reach the works. For when shells are thrown from the trenches into the works of a fortification, or from the town into the trenches, they should have as little elevation as possible, in order to roll along, and not bury themselves, whereby the damage they do, and the terror they cause to the troops, is much greater than if they sink into the ground. On the contrary, when shells are thrown upon magazines, or any other buildings, with an intention to destroy them, the mortars should be elevated as high as possible, that the shells may acquire a greater force in their fall.

* * * * * * * * * *

During a land engagement the pieces are generally placed upon some rising ground before, and at the sides of, the first line, where the enemy is supposed to make the greatest effort, or in some village, garden, or near some hollow way through which he can march; and as they are to advance or retreat, according as the army moves and the enemy approaches, there is no time for raising batteries, except a spot of ground is taken possession of the night before, which is advantageous for covering either a wing or the center, and necessarily to be kept and defended; the heaviest pieces should be placed there, and the others in the most

advantageous manner the ground will admit of; every time they are fired the men advance them to the same place again; so that when the guns are once pointed right, they continue so all the time they remain in the same place. Our present light pieces are wonderfully well adapted for this service, the men being able to move them as they please with very little trouble, and the screws used to keep them at the same elevation are much more convenient than the coins which were used before, because they fly off every time the pieces are fired.

At first the guns are fired with balls, but when the enemy comes near, they are then loaded with grape shot. In this case the charge should not be so much as before because it has been found by experience, then when the charge is great, the shots spread too much, by striking against each other, whereby many of them do no execution, which should be avoided if possible. In my opinion, a sixth part of the weight of the shot will be sufficient upon this occasion. But when pieces are loaded with balls, one-fourth, or perhaps one-fifth, will be the proper charge.

It has been observed by several artillery officers, that howitzers might be used in an engagement to very great advantage, if they were placed on the flanks, so as to fire obliquely upon the enemy's line, or amongst their horse, when loaded with small charges, that the shells may roll and bound along, whereby a great disorder would ensue among them; which being perceived, if they are briskly charged, might be the means of gaining the day. For it must be observed, that cannon shot pass so swift through the ranks, that men are killed without seeing the danger, which the rest look upon as an accident attending their business; but when they perceive the shells rolling along with their fuses burning and expecting them to burst every moment, the bravest among them will hardly have the courage to wait for their coming near him.

It is to be observed, that the powder carts should be near the batteries, not only to supply them with powder, but likewise the troops near them, when that which they receive before the engagement is all spent; because batteries are objects or marks of such a nature as to be known at a great distance; whereas, when the powder is placed anywhere else, the troops do not know where to find it if they are in want.

New Publications of the Infantry Association and of the Quartermaster Association

THE JOURNAL has just received several interesting pamphlets published by the Infantry Association and the Quartermaster Association of Washington, D. C., which are of particular value to National Guard and Reserve Officers.

The Quartermaster Association's offering is a Training Schedule for National Guard and Machine Gun Companies by Captain David P. Livingston, Iowa National Guard, a graduate of the Infantry School, 1924. The Schedule is made up with the view of giving the company commander a permanent, progressive course of instruction for peace time training and under conditions which may vary with different companies. The Training Regulations are the basis of instruction and through the courtesy of the Infantry Board it is possible to refer to many regulations not yet printed, so that the pamphlet will remain up to date for some time to come.

The principal advantage of this pamphlet is that it helps to solve the problem of the heavy turnover in personnel of the National Guard Companies. Once started, a change in commanding officers will have no effect on the training of the companies, as the subordinate officers can carry on the training until the new

company commander becomes acquainted with his duties. The pamphlet is the first of four; the remaining three of which, covering the Howitzer, Rifle, and Battalion, Regimental and Headquarters Companies, will appear in a few weeks.

The publications of the Infantry Association include six booklets of the Officer's Note Book series, prepared for insertion in the Kalamazoo Loose Leaf Binder, the titles being Personal Data, Security and Information, Social Customs of the Service, Mess Management, Morning Reports and Field Orders. The booklets are attractive in appearance, reasonable in price and are of value in that information on any subject is easily obtained. They should be of special interest to newly appointed officers.

Fort Screven

In accordance with a policy adopted by the War Department some time ago, which held that the coast defenses of Savannah, Ga., among others, no longer were valuable as a part of the coast-defense scheme, Fort Screven, which with the ungarrisoned Fort Fremont constituted those defenses, is in process of abandonment as a coast artillery station.

For some time the armament at the post has been in charge of a caretaker detachment of the 121st company of coast artillery, under command of Captain Paul S. Roper, who now has been assigned to recruiting duty at Savannah. Fort Screven is located on the Savannah river, 18 miles southeast of that city.

It remains to be determined what shall be done with the armament. Some, and perhaps all, of the 12-inch guns and 12-inch mortars may be removed and placed in the reserve stock, and the remainder of the coast artillery equipment at the post may be scrapped.

Abandonment of the post as a coast artillery station does not affect its status as an infantry post, and Companies B, C and D of the Eighth Infantry, will remain there for the present. Following the World War and depletion of the personnel of the coast artillery corps, infantry organizations were sent to occupy the barracks and quarters in coast defense stations because of the lack of permanent housing accommodations at infantry stations.—*Washington Post.*

Fund for Prosecution of Income Tax Case

The Editor is in receipt of the following letter from Lieutenant Colonel H. C. Barnes, C. A. C., Executive Assistant to the Chief of Coast Artillery, dated September 12th, which reads as follows:

"The enclosed circular letter was sent out by me to individual Coast Artillery officers and to Coast Artillery organizations last April.

"Replies began to come in almost immediately and continued to be received until August 28th.

"It has not been practicable for me to acknowledge receipt of remittances, but it would doubtless be of interest to Coast Artillery officers generally to know the status of this fund.

"In the pro-rata distribution of the general fund which Colonel Coleman desired to raise, the Coast Artillery Corps was allotted $665.70.

"On August 28th, the date of receipt by me of the last remittance, I had turned over to Colonel Coleman a total of $708.97 received by me from individual officers and organizations of the Coast Artillery Corps.

"Will you kindly publish this letter in the JOURNAL for the information of all concerned."

Trapshooting for Army Posts

"No naturalist discovered the clay-bird. Like many other good things of the earth, it was invented in America.

"For more than forty years this inanimate, mechanically propelled, swift and fragile little flying target has afforded keen sport with the gun for thousands of virile men and women the length and breadth of the land. Every day in the year trapshooters with levelled guns are calling for its catapult flight from its roosting place in gun club traphouses.

"Pull! that's the call of the shooter.

"The puller pulls.

"Out of the open traphouse, propelled by the strong trap, darts a speedy clay target—skimming, soaring * * *

"Bang! hit or miss. The thrill of satisfaction or of disappointment is there.

"That's trapshooting, the sport that holds everybody through its fascination—the sport that few sportsmen ever forsake."

The above is from *The Sport of Trapshooting,* published by the Winchester Repeating Arms Co.

Conditions in the army are almost ideal for this sport. On every reservation there can be found a suitable piece of ground (it is surprising how little space is necessary) quite near the officer's line, yet perfectly safe. Thus there is no necessity for a clubhouse. In the Coast Artillery, particularly, there will often be a place on the beach with sky and sea for background—and one could wish for none better—and soft sand to cushion the fall of unhit birds, so that they can be picked up and used again.

The equipment is simple and cheap. A trap can be bought for less than fifteen dollars, or if only three or four persons are interested, they can use hand traps; the Winchester people describe one that can be homemade in a few minutes from a couple of small boards. If a fixed trap is used, the traphouse can be made of old lumber, or even built of new stuff for about twelve or fourteen dollars. No other permanent equipment is necessary.

Birds, ammunition, and pay of the target feeder, or trapper, will total about seven cents a round.

The Gun Club at West Point affords a very good example of how cheaply the sport may be indulged in the Army. Its sole equipment consists of a trap and traphouse. A shoot is held once a week. Boys are glad to act as target feeders for fifty cents, this sum being divided among the shooters in proportion to the number of rounds fired. The initiation fee is one dollar, and there are no dues. The club, through the secretary, furnishes clay pigeons and ammunition, and each member receives a monthly bill for the birds and shells he actually uses, plus his share of the target feeders large honorarium.

Every conceivable kind and caliber of gun is used. However, the majority of the members fire their regular hunting pieces, usually twelve bores. The experts appear with sixteen, twenty, and even twenty-eight gauge guns, much to the detriment of their scores and the joy of the novices. The ladies of the post take a lively interest in the shoots, and generally there is at least one woman on the firing line. Members often bring pistols or .22-caliber rifles and indulge in a little firing at paper targets to keep their hand in. In fact, the gun club is a great factor in stimulating interest in all kinds of small arms. Where conditions are suitable, regular pistol and small bore rifle ranges could be laid out with but trivial effort and expense.

On days when very few people turn out, it has been found advisable to fire scores of ten shots instead of twenty-five. This makes the shoot last longer, at the same time giving those present more frequent rests, and prevents the temptation of firing an extravagant number of rounds.

To vary the game and stimulate real hunting, "snipe shoots" and "grouse shoots" are held. In the snipe shoot, the firer takes post on line with the traphouse, instead of behind it, and advances toward the house with his gun at the ready. The trap is sprung unexpectedly before he reaches the house. When all have fired a third of their score in this way, starting their advance from the left, they change over to the right and fire another third, then finish up with the shooter advancing from the normal firing position. In the "grouse shoot" two men with hand traps are stationed to the right and left front of the traphouse, sheltered by elephant iron or other protection; the shooter advances from the regular position; suddenly a target skims out from any one of the three traps, and the moment he has fired, a second from another trap is in the air; this scheme is obviously developed to fit the double-barreled gun.

There are many other variations that may be made, and these, together with handicap matches for inexpensive prizes, add a great deal to the enjoyment of the members. If enterprise and discrimination are used by the secretary, it is possible to effect worth-while economies. Some firms allow a discount on weapons, ammunition, etc., purchased through a gun club. The Ordnance Department can sometimes furnish ammunition at lower prices than the retailer can offer. In some cases, the Quartermaster can secure reductions, especially on goods in quantity.

Anyone interested in starting a gun club can secure pamphlets containing all necessary information about layout of grounds, methods of conducting matches, points to be considered in buying trap guns, and countless other things, by writing to the Shooting Promotion Division, Winchester Repeating Arms Co., New Haven, Conn., and the corresponding division of the E. I. Du Pont de Nemours Co., Wilmington, Del.

The 60th Celebrates the Fourth

By CAPTAIN B. BOWERING, C. A. C.

Fourth of July in the States has nothing on that day in the Philippines. Pretty nearly every organization in and near Manila, military and civic, turns out for the big parade in Manila on the morning of the Fourth. This year was no exception to the rule and even General Aguinaldo marched by at the head of his army of former Filipino Insurrectos and did honor to the flag under which he was once loath to serve.

Spectators this Fourth saw a new organization in line in the personnel of the 60th Coast Artillery (Antiaircraft). Although the Regiment had taken part in many large division reviews at Fort William McKinley, this was its first appearance in Manila as a unit and that it upheld the best traditions of the Corps is evidenced by the fact that Battery "B" (gun battery) walked away with the cup, which bears the following engraving "For the Best Appearance Presented by All Regular Military Forces of the United States, Manila, P. I., July 4, 1924." That there was keen competition goes without saying, as in the line of march were the 31st Infantry, 45th Infantry, 57th Infantry, 1st Battalion, 15th Infantry, 14th Engineers, 12th Signal Company, and the 12th Medical Regiment.

The 60th with 40 pieces of motor transportation in line, traveled the seven miles from Fort McKinley, moved at a speed of three miles per hour for a dis-

tance of one mile during the parade, and returned to Fort McKinley without having a motor stall.

On the night of the Fourth, the Regiment in cooperation with a Martin Bomber from Camp Nichols, put on what was probably the most spectacular exhibition ever seen in Manila since the day when Dewey sailed into Manila Bay. Four 3-inch guns had been emplaced near the sea wall on the Luneta between the Army and Navy Club and the Manila Hotel, four sections of machine guns were ready for action at scattered points nearby and a platoon of lights was on the alert. At about 8:30 P. M., the whirr of a plane was heard overhead followed by the "put-put" of a machine gun from the plane. Almost immediately the bomber was picked up by one of the lights and was covered at once by all four of them. The plane was at an altitude of only 200 yards and wouldn't have lasted very long against our machine guns which opened up on him from different points. As the pilot flew out over Manila Bay and gained elevation slightly, the battery of 3-inch guns opened up for several minutes of continuous fire. Rain started to fall about this time and the lone aviator trailed off towards the landing field at Nichols. During the entire time the plane was over Manila, it was held in the beams of the searchlights. The whole maneuver showed excellent training on the part of the personnel of the light sections for the plane came over without warning and no signals of any kind were used, although emergency signals from the plane were provided for in case of trouble.

The 60th, being stationed on the mainland at Fort William McKinley, the largest post in the Islands, has been afforded the very best opportunity for training, in cooperation with the Philippine Division at McKinley, and the Air Service at Camp Nichols about three miles distant; and best of all, we have had the opportunity to "advertise our wares" among other branches of the Service, particularly the Infantry. The result has been a better understanding of our work and aims by fellow officers and men of the Service and the making of many new friends, not only for the 60th, but for the Corps as a whole.

Excellent Target Practice of the 241st Coast Artillery

Lieutenant Colonel Charles C. Burt, C. A. C., instructor of the 241st Coast Artillery, Massachusetts National Guard, has the following to say regarding the firing record of the 3rd Battalion of that regiment: "This Battalion is assigned to 10 and 12-inch B. L. Rifles. We have no armament in the armory other than complete fire control installation, using a settee as a gun for drill purposes.

"We arrived at Fort H. G. Wright, N. Y., on August 2nd and, after preliminary drill and subcaliber practice, had service practice on the 13th. The four batteries completed their practice of eight shots each in one day. The first 12-inch firing by Battery M, Captain Raymond Brockelhurst commanding, was good, registering three hits; the second 12-inch, Battery A, Captain Charles H. Phillips commanding, came along with six hits, one which tore the canvas covering off the target. The first 10-inch, Battery B, Captain Thomas J. Clifford commanding, registered eight plotted hits. I thought there was nothing more to look forward to in the day's work, but Battery I, Captain Charles W. Borden commanding, went to bat and turned out eight hits, one of which so completely demolished the target that only the bridle was salvaged. The maximum range deviation during this last practice was 27 yards.

"The remarkable thing about the practice was this: The probable error of the gun was assumed as 70 yards; the first shot was observed from airplane and tug

as five yards over; the second shot demolished the target; the remaining six shots of the series ranged from 15 yards short to 27 yards over with a maximum of .05 deflection. During the practice the battery commander made no range correction, and the analysis of the practice showed no compensating errors on the part of the personnel that might account for the remarkable lack of dispersion.

"Both firings from the 10-inch battery were from the same gun and I call it a very unusual accomplishment when a 10-inch, or any other large caliber gun, can be coaxed into registering sixteen successive hits at ranges varying from 7500 to 5900 yards. Another interesting point is that both of the 10-inch batteries were Federally recognized less than a year ago and neither of the battery commanders had ever conducted a practice and only a few of the enlisted men had ever taken part in one."

A New Gunners' Instruction Manual

The publication of the 1924 Edition of Gunners' Instruction for Fixed Guns has just been completed and the book may now be obtained from the Bookshop, COAST ARTILLERY JOURNAL, at Fort Monroe. This edition has been completely rewritten and revised and is as up-to-date as is possible in view of the constant improvements in artillery technique. The pamphlet contains 222 pages, an increase of 80 over the previous edition, including an entirely new section of 56 pages devoted to the instruction of candidates for expert gunners. The book is well illustrated and is bound in heavy paper with cloth backing, making it much more substantial than former editions.

Company commanders will be glad to learn that in spite of improvements there will be no increase in price.

The Outstanding Lesson of the World War

The outstanding lesson of the World War was the vital importance of industry in its relation to modern war. Armies have always needed food, clothing and munitions. But there is a very close relation between the tactics and strategy of a people, and its industry and science. The last fifty years have seen unprecedented advances in science and in industrial practices. With the modern methods of mass production our factories can produce munitions in quantities far beyond anything that was dreamed of up to the time of the Civil War. Up to the time of the World War our military men devoted their time to the study and practice of tactics and strategy, and our record in France shows that our military leaders were well grounded in the basic principles of war. Our pre-war general staff started their studies with the assumption that necessary munitions would be forthcoming from the factories. The problems of the maneuver field were well understood; but our professional soldiers were so far removed from the atmosphere of trade and industry that they did not even realize that modern war would involve an industrial problem which might be even more serious than the military problem. Today even the genius of a Napoleon would avail nothing unless there were ships and railroads and motor trucks to keep a constant stream of munitions moving from the factories to the front. The expenditure of supplies in a modern battle is enormous, and plans for war must extend not only back to the factories, but beyond that to the raw materials without which the factories would stop.—*Extract from address by Dwight F. Davis, Assistant Secretary of War.*

PROFESSIONAL NOTES

Coast Artillerymen and the Army Ordnance School

It is the desire of the Chief of Coast Artillery that officers of the Coast Artillery Corps be informed as to the nature of the Ordnance School, located at Watertown Arsenal, Mass., and of the fact that through the cooperation of the Chief of Ordnance, it will be possible for a few specially selected Coast Artillery officers to pursue this course. In order to do this a technical transfer to the Ordnance Department must be made, but the Chiefs of Ordnance and Coast Artillery will unite in recommending a retransfer back to the Coast Artillery Corps of any officer who so desires, upon completion of the course. There can be no doubt that any officer of Coast Artillery would be benefited materially for duty with his own branch by the completion of the course at the Ordnance School.

The Chief of Coast Artillery desires the younger officers of the Corps to understand also that, in his opinion, such of them as have predilections and talents for permanent transfer to the Ordnance Department should not feel any hesitancy in applying for transfer to that department after a proper length of service in the Coast Artillery.

The course at the Ordnance School has for its general mission the preparation of officers to design Ordnance materiel of all kinds. The course requires two years for completion. The first year is devoted to a summer session and an academic year at the Massachusetts Institute of Technology where the work is largely theoretical and a preparation for the practical work of the second year. The subject matter of the course is briefly outlined below. Any officer desiring further information can secure same by writing direct to the Chief of Coast Artillery.

First Year—Massachusetts Institute of Technology, Summer Course, July 5 to September 27.

This includes a study of calculus including differentiation, differential properties of curves and differential equations of the first order; a study of the fundamental principles of kinetics and statics; and work in the gas engine laboratory including the stripping and assembling of the different types of gasoline engines and accessories used by the Ordnance Department.

First Year—Massachusetts Institute of Technology, Academic Year, October 6 to June 20.

This includes lectures on the fundamental principles of inorganic and organic chemistry, stress being laid on the important principles governing the manufacture and functioning of explosives and their component parts; a study of the steam and mechanical equipment of a power station, including a discussion of the physical properties of gases and of saturated vapors; a further study of

the principles of kinetics and statics; a study of the fundamental principles of the mathematical theory of elasticity as applied to cases involving plane stresses and plane strain; a study of the general principles involved in the generation, distribution and utilization of electric power with special application to Ordnance Service; and twenty two-hour exercises in the power laboratory with forty hours outside work of calculations and reports, the purpose being to familiarize the student with the method of testing various types of power equipment and the proper method of writing a report of such tests.

Second Year—Watertown Arsenal.

The work here is practical, seventy days of the student's time being spent in gaining familiarity with the handling of the various drills, lays, shapers, planers, etc., with which the Arsenal is equipped. Thereafter the student is assigned in turn to work in the Foundry, both in the casting and melting division and is expected to learn the characteristics of castings so that in designing he may use them intelligently and in turn design them intelligently; to the Gun Forging Department where he is assigned as helper to acquaint himself with the handling of the presses, hammers and other equipment; to the Erection Shop where the student takes part in the final test of at least one gun carriage; to the Smith's Shop where instruction is received in machine forging; to the projectile and Press Room where the actual operations on one armor-piercing and one high explosive projectile are followed in every detail and full note taken of the process; to the pattern shop where instruction is received in the construction of wooden patterns. In addition, the student hears lectures on chemistry and metallurgy and receives laboratory instruction that relates to the practical work of the plant.

Fire Control System for 155-mm. Guns

In the August issue of THE JOURNAL was published an article entitled "Fire Control System for 155-mm. Guns," which had been prepared by the Coast Artillery Board as Project No. 75. This article contained the recommendations of the Board but did not include the action of the Chief of Coast Artillery thereon. For the information of those especially interested, pertinent parts of his action on this project are quoted below:

"The recommendations contained in subparagraphs (a), (c), (d), (e), (f), (g) and (b), subject to remarks contained in paragraphs 3 and 4, below, paragraph 65, are approved. Action will be taken by this office to make the necessary changes in tables of basic allowances. It is not probable that final action can be taken in reference to the recommendations contained in subparagraphs (e) and (f), except in regard to the 37-mm. gun for subcaliber purposes in the next revision of tables of basic allowances, but these tables will be revised as soon as standard equipment has been developed and adopted.

* * * *

"In reference to the recommendation to adopt the Pratt Range Board for use with the 155-mm. gun batteries, it is desired that the Coast Artillery Board reconsider the type of Range Correction Board for these units. It is believed that consideration should be given to the range correction board similar to that tested by the Coast Artillery Board as contained in Coast Artillery Board Project No. 174. Seventy-three range correction boards required to completely equip 155-mm. gun batteries now in the service and provided for in the first phase of the Mobilization Plan will have to be manufactured. The relative cost

of the manufacture of the two types of range correction board, their portability and their general suitability for this armament should be given consideration.

"The estimated cost of manufacturing range computers, circular type, in lots of 50 is $42.00 each. The price of the range correction board, Model 1905, is $291.44 and the estimated cost of manufacturing these boards in lots of 50 is $325.00 each.

"The recommendation contained in paragraph 66 is not approved as all pertinent matter has been published, or will be published, in Training Regulations.

"The recommendations contained in paragraph 67 and 68 are approved.

"It is desired that this communication be returned for transmission to the Militia Bureau and Chief of Ordnance."

A Suggestion for Antiaircraft Gunfire

By Lieut. Col. D. M. F. Hoysted, D. S. O., R. F.
(in the Royal Engineers Journal)

Have you ever watched a large fire in London and noticed the wonderful accuracy with which the firemen can guide the powerful jets so as to reach the exact spot which they wish to strike with the water-stream?

The men in charge of the nozzles are chosen for their size and strength, in order to be able to hold them steadily so as to ensure accuracy of aim. Obviously they reach their target by very quick correction of aim (elevation and direction), which they are easily able to apply because the curve of the water-jet is continuous and they can see where it is falling at any given instant. As they increase the elevation, the point of impact of the jet with the target rises to correspond, and the fireman can stop elevating when he sees that the water-stream is washing over the object he wishes to strike.

During the war, how many times must the casual observer of an antiaircraft artillery attack on a Boche machine in France have been struck with bewilderment at the fact that it was possible for the burst of shells to maintain such an immense error of distance from the target.

It is true that to be successful as an antiaircraft gunner is extraordinarily difficult, and that the difficulties hardly appear till one begins to study the theory of aircraft flight with the hope of finding some very weak point on which to base an easier method of attack.

The airman can move instantaneously in three dimensions while traveling at any speed up to a hundred yards a second. His height and speed are unknown, the only obvious factor being his direction at any given instant. Even this factor is disturbed by the knowledge that he can alter it with great rapidity. The time of flight of the shell may be twenty seconds, during which period the machine may have moved over a mile.

There are some wonderfully clever instruments by which the height and fuze range may be determined quickly, but when one realizes that the machine, if passing straight over the gun at 150 or 200 miles an hour, may only be within range for a couple of minutes while coming and another couple of minutes while going, the trouble of the gunner's life may be more easily imagined. Besides which, only a very small portion of the actual target is vulnerable, and only the vulnerable parts count at this game in which the result of a shot is either a hit or a

miss, and a splinter may pass through wings, tail or fuselage without recording a counting hit.

The method of attack at present in vogue is to find the height and consequent fuze range before the hostile machine is within fire range, if—and this one is a very big "if"—it is a clear day, *and* it is spotted in good time, *and* there are no other hostile distractions. A burst of five shells is fired: time taken about fifteen seconds. As soon as the bursts can be observed, correction is made for lateral and horizontal deflection and another five sent on their way. If the initial computations are good and the gun is well handled, the second correction of deflections should give the best results obtainable. The firing record would be approximately as follows:—

First five rounds	15 seconds
Time of flight (say)	12 seconds
Correcting fuze settings for next burst	5 seconds
Observation and correction	5 seconds
Second burst	15 seconds
Time of flight (say)	8 seconds
Observation and correction	5 seconds
Correcting fuze settings for next burst	5
Third burst	15 seconds
Time of flight (say)	5 seconds
Total	90 seconds

The corrections must be judged and applied with lightning speed, as the essence of the whole operation is time—to get in the greatest number of carefully aimed rounds that is possible, in the period during which the target is within effective range. But these corrections can only be based on conditions noted ten seconds before the shells are fired, and are ancient history by the time the shells reach their positions of burst.

When speaking to a gunner who had a large percentage of successes compared to others, the writer was told that the study of the psychology of the enemy pilot played a large part in the estimation of his correction for deflection, because of the great difficulty of obtaining and applying them correctly when mechanical means were used. On one occasion, when he was firing at a German Intelligence patrol machine, he realized that the pilot always made his turn in the same direction at more or less the same point. So, instead of following him up on his line of flight as before, he laid for him at the turn and brought him down.

The chief reason why it is necessary, at present, to fire sets of five rounds and observe the bursts for correction of deflections, is that otherwise so much ammunition would be used up that it would be impossible, at present, to ensure the continuity of the supply. But this difficulty is obviously governed by relative values, which are subject to fluctuation. A few years before the war, while the writer was in Egypt, officers were invited to write an essay on their opinion for an ideal infantry company. The writer's suggestion was as under:—

Riflemen (with bayonets)	100
Maxims and crews	5
Number of Companies to the Battalion	6

The adverse criticism made by the General Staff was to the effect that the number of machine guns was beyond all possible requirements and that the ammunition supply would be impossible. Yet how many machine-guns, exclusive of Lewis guns, did the end of the Great War find affiliated to a battalion?

Even supposing that the supply of ammunition for an antiaircraft gun must not be increased beyond the present establishment, would the gunner not have a better chance of bringing down his target if it were possible to apply his correction in the same way as the fireman makes them when using his hose? Supposing the gun were of the nature of a 3-inch automatic feed machine-gun, firing one shell every two seconds, the number of rounds fired per minute would be thirty. But, and it is with this "but" that the value would be noticed, the chain of bursts would be definite and would approach the regularity of the water stream. So that the gunner could apply his correction much more quickly and automatically, as the corrector would be the gun-commander, who would be independent of section officer and all instruments as soon as he found he was near his target. There would be more chance of obtaining a hit in this way with sixty rounds in two minutes than there would be with sixty rounds spread irregularly over six minutes.

Of course, the comparison of the shell and the jet fails to a certain extent, because the latter is directed at a large and solid object and its efficacy does not depend upon the correct time of flight. But it should be quite possible to apply correction for fuze range while the shells are held in their belt or other feed arrangement. So that, taking an average time of flight of ten seconds, the gun-commander and setters should be able to apply the necessary fuze correction to say, the tenth and subsequent shells, while making sure of correct alignment with all. The ease and certainty of the correction would be much enhanced if every fifth projectile in the belt were a tracer shell.

There would be great difficulties in the design of an automatic gun of the size indicated, though the construction of a 4-inch machine gun for naval use was mooted some years ago in the United States. The maximum weight of shell hitherto fired from a machine gun is only two pounds, while the tendency for efficient antiaircraft work is to increase the weight even of the present shell.

Browning 37-mm. Automatic Guns

In the presence of a number of Army and Navy Ordnance officers, Mr. John M. Browning, the noted gun inventor, demonstrated his new 37-mm. Browning automatic gun at Aberdeen Proving Ground, Maryland, on April 2.

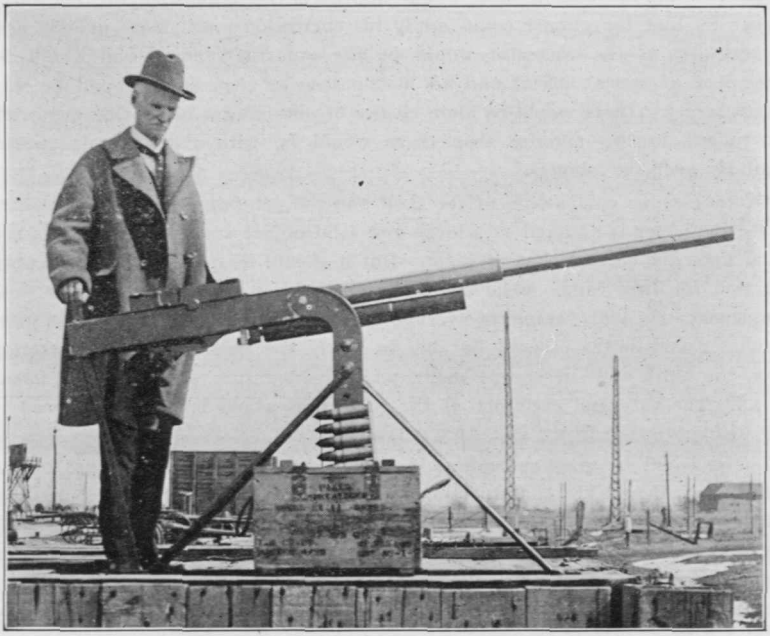
The demonstration included firings of two of these guns, alike in design but, due to difference in power (one being built for a muzzle velocity of about 1300 f.s. and the other for 2000 f.s.) considerably different in length and weight.

The firings included the use of the guns with barrel in a vertical position, in a horizontal position, elevated to 45°, and depressed to 45°, as well as a certain amount of firing with the gun upside down and on its side. Both guns functioned perfectly.

The demonstration given by Mr. Browning becomes an event of importance when the military value of this achievement is recognized. For a great many

years, it has been the goal of inventors and engineers to produce a practical automatic gun firing an explosive projectile weighing not less than one pound. In the Boer War there was used the famous "Pom Pom," which was nothing more or less than an overgrown Maxim machine gun. The "Pom Pom" received its name from the characteristic sound of firing. From a military point of view the "Pom Pom" was not successful, by reason of its great weight and its low velocity.

During the World War the old idea of the "Pom Pom" was used again, and several guns firing one-pound shells were seen on both sides, the Germans particularly using an automatic 37-mm., which was similar in design to the German Maxim, but, of course, was very large.



All of these various types of weapon were fed by means of a belt, to which there were some objections in the larger calibers. The new Browning guns are fed by clips and are capable of delivering a rate of fire of about 100 to 150 shots per minute.

The design is distinctly different from that of Mr. Browning's well-known machine gun, although both guns are based on the same general principle, i.e., recoil of the barrel.

There are three military uses for guns of this type. First, for the Air Service as an aircraft automatic gun in the armament of planes for use against ground targets as well as other types of Air Service targets. Second, as an antiaircraft weapon; a gun of the same general type with higher velocity would be most effective as an antiaircraft weapon. Third, as an Infantry gun, as it is possible that an automatic 37-mm. gun with lower muzzle velocity and less size

and weight, would become a very satisfactory weapon for this extremely important purpose.

The entrance of Mr. Browning into the field of larger caliber automatic guns is of great interest to the Army and Navy. In the past these two branches of the service have relied for their automatic pistols and for some of their most effective small caliber automatic guns, such as the Browning machine gun and the Browning automatic rifle, on the Colt's Patent Fire Arms Manufacturing Company, with which Mr. Browning is connected. The Colt Company, as well as Mr. Browning, are to be congratulated upon their entry into the design of larger caliber automatic weapons and upon their initial success.

Among those present at the test were Mr. John M. Browning, the inventor; Mr. S. M. Stone, President of the Colt's Patent Fire Arms Manufacturing Company; Mr. F. T. Moore, works manager of the Colt's Patent Fire Arms Manufacturing Company; Brigadier General C. L'H. Ruggles, Chief of Manufacture, Army Ordnance Department; Brigadier General J. W. Joyes, Chief, Technical Staff, Army Ordnance Department; Colonel W. H. Tschappat, Commanding Officer, Aberdeen Proving Ground; Commander H. Delano, Navy Department; Lieutenant Commander G. L. Schuyler, Navy Department; Lieutenant Colonel C. M. Wesson, Executive Assistant to the Chief of Manufacture, Ordnance Department; Major Earl McFarland, Commanding Officer, Springfield Armory; Major Lee O. Wright, Chief, Small Arms Division, Manufacturing Service, Army Ordnance Department, and Major G. P. Wilhelm, Chief Small Arms Division, Technical Staff, Army Ordnance Department.

A 37-mm. automatic gun has been an objective long sought by inventors and engineers. It now seems an accomplished fact.—*The Army Ordnance, July-August, 1924.*

Army Antiaircraft Artillery

Major General F. W. Coe, Chief of Coast Artillery, has announced, in connection with antiaircraft artillery, that it is planned to build a 3-inch gun, although there has been developed a 4.7-inch gun which has not yet been subjected to a field test. The experts are not at all certain that that is the gun desired, while they are certain that the 3-inch gun is an effective weapon which they expect to build. Before the construction begins, a matter of six months yet, there may be some improvements adopted in the particular design of that type of 3-inch gun, but the caliber is fixed. It is contemplated to conduct a test of a 3-inch gun, which has certain improvements with respect to carriage and which has been developed by the Ordnance Department. The development of gun defense against aircraft is one of the most important duties which has been assigned to the Coast Artillery Corps. At the end of the war we had the following guns: 3-inch on fixed mounts, 159; 3-inch on trailer mounts, 119; 75-millimeter guns on truck mounts, 51; a total of 329. The 75-millimeter that we acquired from the French were low-muzzle velocity and are of no use, practically, except for training purposes. Of the 3-inch guns on fixed mounts, there are 72 now in foreign possessions and 87 in the United States. Of the 3-inch trailer mounts there are 52 in foreign possessions and 67 in the United States; a total of 154 guns in the United States; that is, effective guns in the United States; and in the foreign possessions, 124. The number of guns which will be required for manning the regiments which are provided for in the War Department mobilization plans—that is, regiments of the Regular Army, of the National Guard, and of the Organized Reserve—is 860. All of the antiaircraft guns for which the

War Department presented an estimate in this year's appropriation will be sent to Hawaii and Panama. There will be none for the general use of the army.—*Army and Navy Register.*

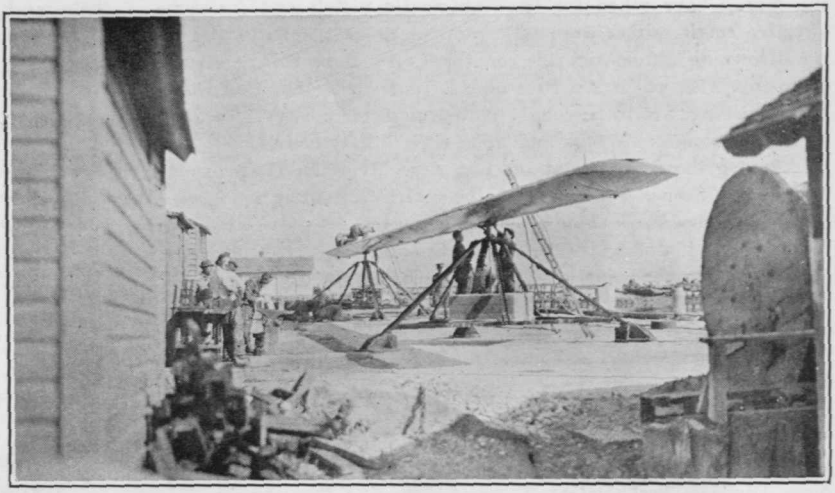


FIG. 1

Sub-Aqueous Sound Ranging

THE JOURNAL is indebted to Colonel R. S. Abernethy, C. A. C., for the accompanying photographs of a 110-foot multispot binaural water station. Figures 1 and 2 show the station taken at Fort Wright and 3 while the station was being planted in the sea bottom of Block Island Sound.

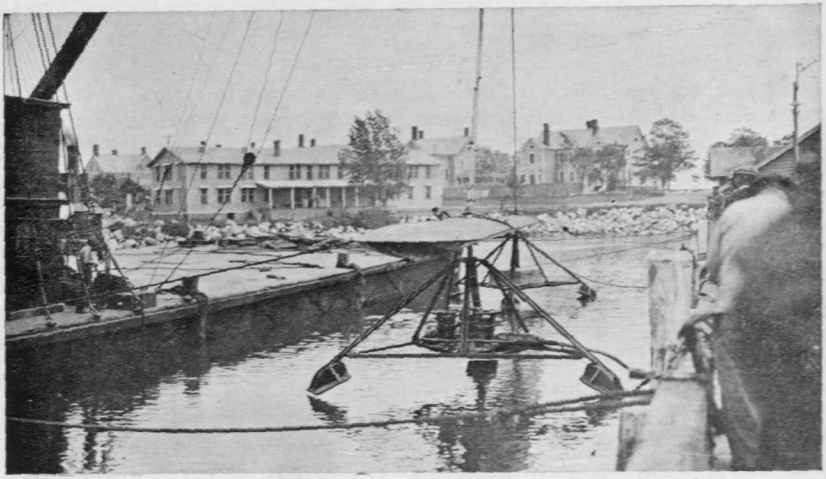


FIG. 2

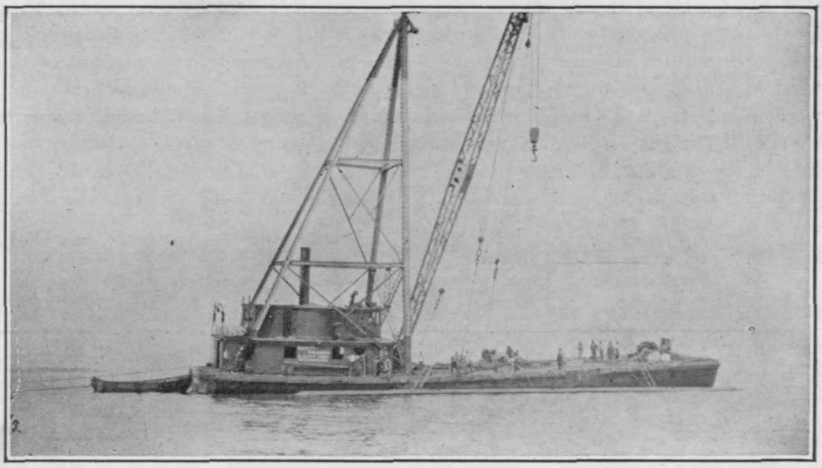


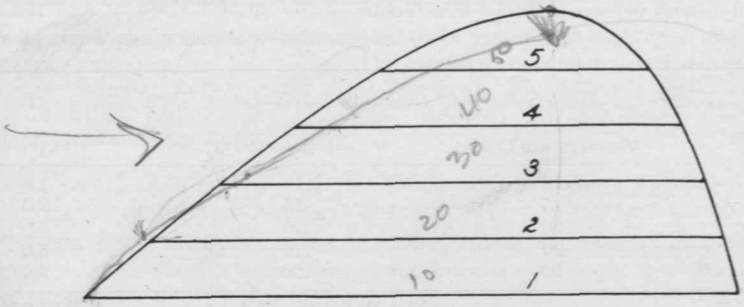
FIG. 3

Weighting Factors

By LIEUTENANT PHILIP SCHWARTZ, O. D.

An explanation of the constructing of weighting factor curves may serve to give a definite conception of a ballistic wind.

Given a trajectory divided into five equal altitude zones:



suppose that a projectile is fired over such a path and that it is subjected to a wind which changes value as the projectile rises. The wind in the top zone, where the velocity of the projectile is least, acts for a longer time on the projectile than the wind in the lower zone, where the velocity of the projectile is greatest. The upper wind causes a correspondingly greater effect on the motion of the projectile. Another consideration, however, reduces this difference in effect, because the air density in the upper zones is less than that in the lower zones, and the wind in the upper zone therefore has a smaller pushing effect on the projectile. Whatever the net result of all of the factors entering into the problem, it can be seen that a wind in zone 1 will not necessarily change the range or deflection by the same amount as a wind of equal magnitude blowing in zone five.

Let a unit range wind of one mile per hour act on the projectile while it is passing through zone 1; let there be no wind in the other four zones. Assume

that as a result of this wind, the normal range is increased by two yards. Now let the same unit wind act on the projectile while it is in zone 2; as in the previous case let the winds in zones 1, 3, 4 and 5 be zero. Assume that as a result of the wind in zone 2, the normal range is increased by 3 yards. Similarly, let a unit wind in zone 3 cause 4 yards increase in range, in zone 4, 5 yards, and in zone 5, 6 yards. The net result of a unit wind blowing over the whole trajectory will then be the sum of the partial effects, or 2+3+4+5+6, a total of 20 yards. The weighting factors can then be obtained as follows:

Zone	*Fraction of maximum ordinate to top of zone*	*Effect of mile per hour wind on range in zone, yds.*	*Fractional part of total effect-weighting factor*	*Sum of weighting factors in (4) to top of zone*
1	.2	2.0	$\frac{2.0}{20}=.10$	.10
2	.4	3.0	$\frac{3.0}{20}=.15$	.25
3	.6	4.0	$\frac{4.0}{20}=.20$	.45
4	.8	5.0	$\frac{5.0}{20}=.25$	.70
5	1.0	6.0	$\frac{6.0}{20}=.30$	1.00
	Total effect	20.0	Total 1.00	

A plot of column (2) against column (5) is a weighting factor curve for the particular conditions under which the original trajectory was obtained. The figures in column (4) are the weighting factors.

To show how these factors are used, suppose the measured range winds in a particular case are as tabulated in column (7).

(6) *Zone*	(7) *M. P. H. Measured wind speed*	(8) *From Column (4) Weighting factors*	(9) (7)X(8)
1	10	.1	1.0
2	15	.15	2.2
3	20	.20	4.0
4	20	.25	5.0
5	30	.30	9.0
		Ballistic wind	21.2

If the winds of column (7) all blow in the same direction, the ballistic range wind is 21.2 miles per hour and the effect on range 424 yards. If the direction of the wind varies also, which is the usual case, then in summing column (9), the vector sum is obtained by plotting the quantities in the column to scale and laying them off in the direction of the observed zone wind.

The same method of construction and application to practical cases holds for ballistic cross wind, ballistic density, and ballistic temperature.

Each combination of gun, powder charge, projectile, and angle of elevation, has its own weighting factor curve for wind, density, and temperature. However, it is not practicable for meteorological stations to supply exact ballistic values for every caliber, velocity, and elevation. One mean weighting factor curve for all guns for each of the quantities, wind, density and temperature, is now being used by batteries at posts and in the field.

BOOK REVIEWS

Sea Power in Ancient History. By Arthur MacC. Shepard. Little, Brown & Co., Boston. 1924. 6″x 9″. 256 pp. Illustrated. Price, $5.00.

To the student, this addition to the literature on Sea Power should prove of considerable interest. Containing many references to Admiral Mahan's famous work, this volume covers the period of classic Greece and Rome and may well take its place among the many other works on this general subject. It is well written, readily readable and has been well put up by the publishers. A comprehensive bibliography provides the reader with sources and references.

An extensive introduction deals with the warships, personnel and naval tactics of those early days. From this the author proceeds with his exposition of the naval affairs of ancient Greece and the consequent expansion and development followed by the decline both in sea power and national importance. His discussion of Roman naval activity brings forth the Roman ability of rapid construction of enormous squadrons, of the quick assembly and training of personnel and of the generally successful conduct of operations, in spite of an innate dislike of the sea. By adapting a type of land fighting to naval warfare and using the best of captured ships for patterns, the Romans made up for much of their lack of proper preparation. The "Conclusion" is a good recapitulation of the preceding chapters while several extracts from the early writers form interesting appendices.

As Admiral Moffett states in his Foreword, "Mr. Shepard's book abounds in proofs of the fact that sea power since the early days has always affected the welfare of maritime nations."

The Coming of Man. By John M. Tyler. Marshall Jones Company, Boston. 1923. 6½″x 9½″. 142 pp. Price, $2.00.

This is the sixth volume in the series written by Amherst men known as "The Amherst Books," and embodies the mature conclusions of a distinguished biologist.

The first chapter starting with "The Coming of Life" leads the reader through many interesting passages of time, tracing this life through its different phases embodied in chapters on "The Coming of a Backbone," "The Rise of Land Life," "The Coming of Savage Man," "The Dawn of Civilization," "The Rise of Personality," "The Logic of Evolution," "Nature and Man," "Man and Environment," "Survival of the Fittest," and "Perfect Health." Each chapter abounds with food for thought.

It is obvious that it is impossible to compress the whole biological history of animal and human life into one book, nor does the author attempt to do this. It is an introduction to a great subject—an outline devoid of all shading, and it is for this reason that it will appeal both to the student and layman; to one it should prove a most refreshing review, to the other it will lead to an acquaintance with a subject that is of absorbing interest.

Accepted and Established Doctrines of the Coast Artillery

A Letter From Lieutenant Colonel H. C. Barnes,
Executive Assistant to the Chief of Coast Artillery

September 30, 1924.

To the Editor,
Coast Artillery Journal,
Fort Monroe, Va.

Dear Sir:

I have just read Major E. J. Cullen's article in the September Journal entitled "The Function of Coast Fortifications in the Positive System of Coast Defense."

Major Cullen's article is an interesting exposition of the role of coast fortifications, and I am entirely in accord with his views on that question.

He writes, however, of eliminating the "present vague and conflicting ideas caused by our use of ambiguous terms and confusing terminology."

I do not know just what terms and terminology he refers to, but without doubt, if we are using such terms and terminology, we should stop such practice at once, and I am sure that the Chief of Coast Artillery would welcome definite suggestions to that end. For some time past, in the preparation of Coast Artillery Training Regulations, we have been making changes in the terms and terminology heretofore used in our texts so as to conform as far as possible to those adopted by other branches of the service. There are certain terms, however, which apply solely to Coast Artillery units and activities and, in the absence of any constructive suggestions for improvement, the use of these terms must be continued.

The principal reason which impels me to write this letter, though, is to correct the erroneous impression which Major Cullen's article must have created regarding the conflict which he assumes to exist between our Coast Artillery tactical doctrine and the tactical doctrine of the Army.

I am not aware of any *accepted and established* doctrine of the Coast Artillery Corps, tactical or otherwise, which does not conform to *accepted and established Army doctrine.*

Major Cullen apparently bases his statements regarding such a conflict upon the "oft-repeated reference to the *independent* mission of coast fortifications and the *independent* command of Coast Artillery commanders."

Surely there is no Coast Artilleryman who, by any flight of the imagination, has assumed that our harbor defenses, (or coast fortifications, if you choose to so designate them), constitute, of themselves, a complete defense of our coast. The Positive System of Coast Defense sets forth very clearly the War Department doctrine in this respect, and I have never yet heard a Coast Artilleryman offer the slightest criticism, or dissent in any particular from the provisions of that pamphlet which refer to the role of the harbor defenses.

The War Department does announce in Training Regulations 10-5, that the Coast Artillery Corps "has the independent role of keeping the area within reach of its guns clear of hostile vessels and of preventing a run by." Surely this is correct. No other combat arm, except the Air Service, can assist in the execution of this mission, and, in spite of the many claims advanced by the proponents of abolishing coast fortifications and depending entirely upon the Air Service for our defense against hostile navies, I maintain that, in the present state of development of our defensive means, this role is still the mission of the Coast Artillery Corps—assisted so far as possible by the Air Service.

The Coast Artillery Corps does not understand from this, however, that the harbor defenses constitute an independent command, exempt from any tactical control.

Major Cullen writes that "this (the development of the tactical doctrine governing the use of coast fortifications and their mission in any system of coast defense) is a matter of vital importance, not only to the Coast Artillery Corps, but to the entire army, and demands immediate action," and that "* * * it * * * requires intensive study that will lead to the development of concrete ideas as to the fundamental tactical principles involved."

Here again Major Cullen apparently makes an erroneous assumption—that these matters have not been studied intensively. As a matter of fact, they have been made the subject of very considerable study which has resulted in the formation of very concrete ideas on this subject, and these ideas have been presented by the Chief of Coast Artillery to the War Department for approval.

I might say that the recommendations made in regard to this question contemplate removal of harbor defenses from the command of Coast Artillery District commanders upon the establishment of sectors and sub-sectors as contemplated in the Positive System of Coast Defense. The well established principles concerning command require that they (the harbor defenses) be placed under control of sector and sub-sector commanders just as are all other means of defense included in these areas. This should in no way interfere with the execution of the independent role assigned by the War Department to the harbor defenses. Furthermore, in the execution of that independent role, the Coast Defense Commander is the senior commander who can exercise any tactical function. This makes unnecessary the continuance beyond that time of the exercise of any function of command over these activities by the Coast Artillery District Commander.

The vague and conflicting ideas, referred to by Major Cullen, if they do exist, should be eradicated, and I might say in this connection that the recommendations made by the Chief of Coast Artillery, above referred to, were, at the time they were made, communicated to the Commandant, Coast Artillery School, for the information of Coast Artillerymen. If and when they receive the approval of the War Department, they will be published in proper form, of course; will then partake of the nature of accepted doctrine, and will be available for study and reference by all concerned.

If Major Cullen, in referring to the vague and conflicting ideas on this subject, means that officers of other branches entertain such ideas, the correction must be applied to the teachings at the Command and General Staff School.

The Chief of Coast Artillery recognizes that the time devoted at Leavenworth to this subject is insufficient and that the methods of presenting the subject to the students are not the best that could be employed. He hopes to bring about a correction of these conditions through the medium of the Educational Advisory Board recently constituted by an amendment to A. R. 350-110.

I request that this letter be published in the Coast Artillery Journal to the end that all concerned may be assured that accepted and established Coast Artillery doctrines accord in all respects with accepted and established army doctrines.

H. C. Barnes
Lieut. Colonel, C. A. C., Executive Assistant to the Chief of Coast Artillery.